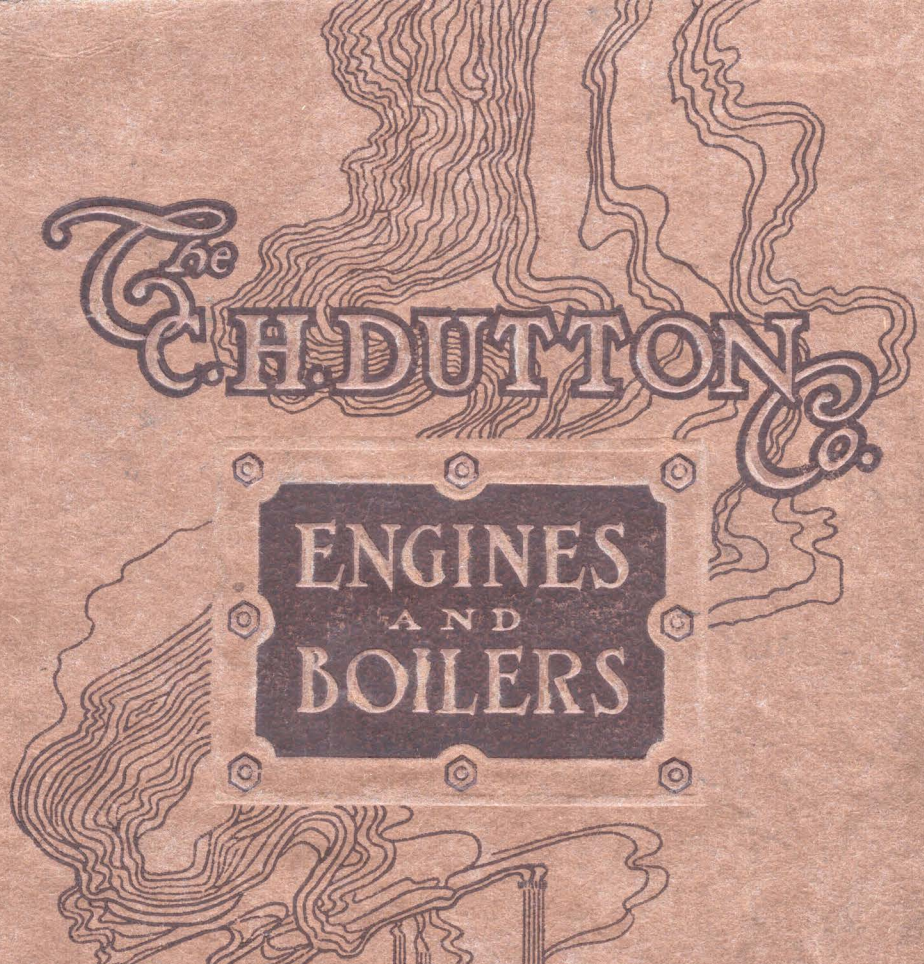
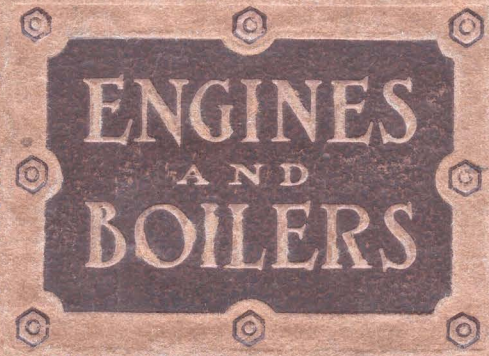




The
C. H. DUTTON
Co.



ENGINES
AND
BOILERS

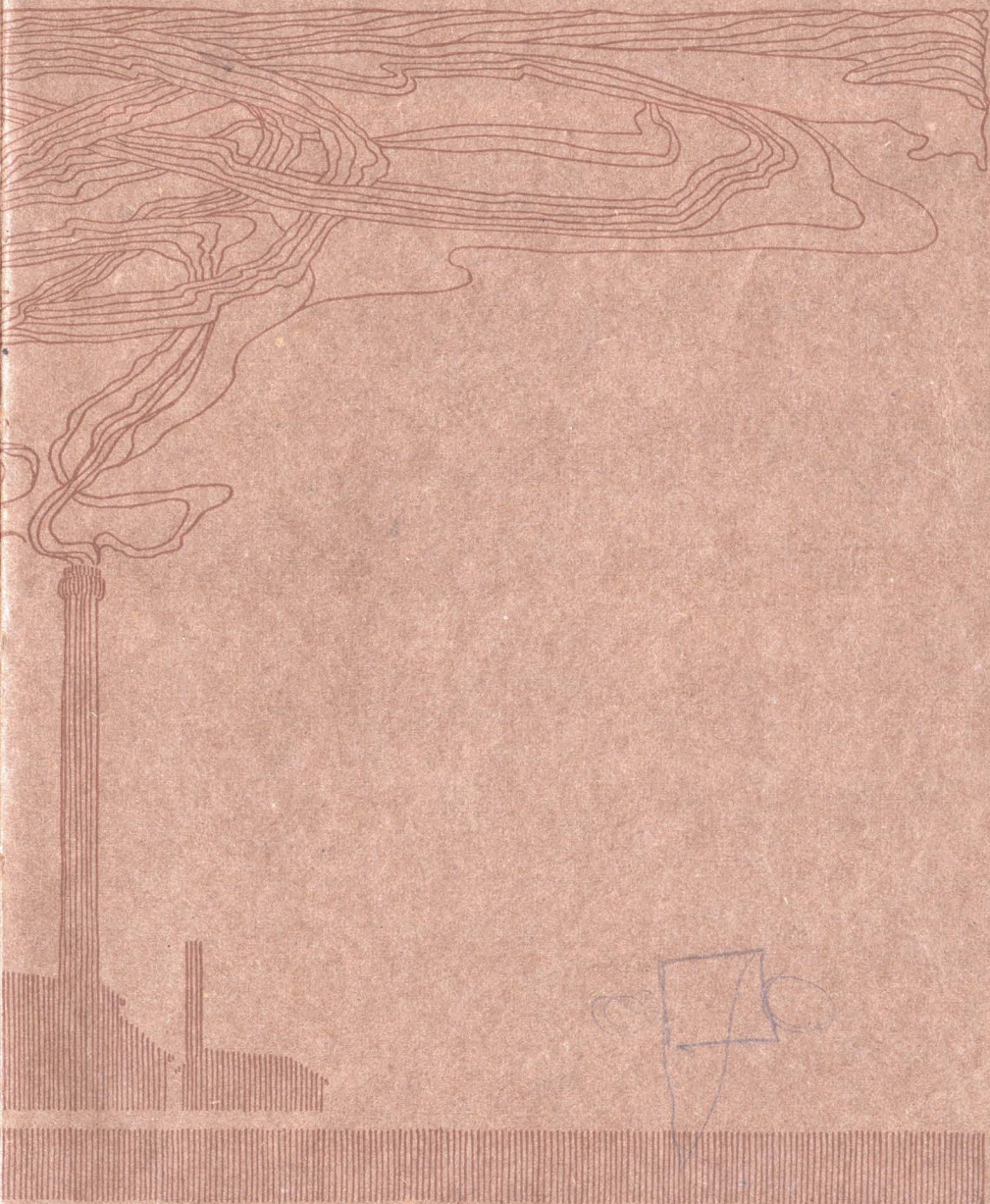


KALAMAZOO
MICHIGAN, U.S.A.

THE C. H. DUTTON CO. ~



ENGINES AND BOILERS



MANUFACTURERS OF
STATIONARY AND
PORTABLE

STEAM ENGINES & BOILERS



MECHANICAL SUPERIORITY

SERVICE

ECONOMY IN FUEL CONSUMPTION

PROMPT SHIPMENTS

The Inducements We Offer

*Our Goods are in Use Throughout the Country
Results First Class*

16TH ANNUAL CATALOGUE

1912

Our Leaders

THE JEWEL AUTOMATIC ENGINE

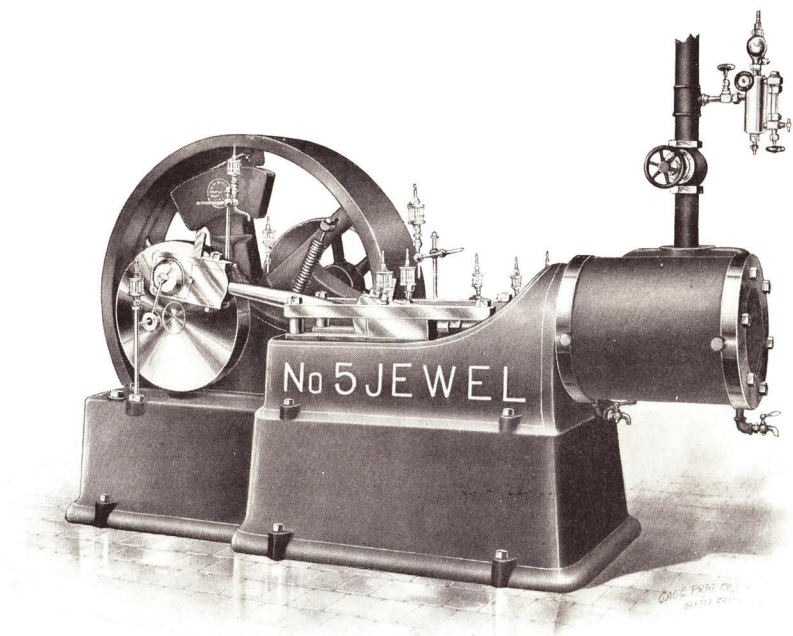
With Rites Governor

LONG STROKE VERTICAL ENGINES

With Continuous Oiler for Crosshead and Crank Pin

FLANGE STEEL BOILERS

With Guaranteed Charcoal Iron Tubes



A Silent, Powerful, Simple, Efficient, Automatic Engine

Introduction

WITH pleasure we present herewith our new catalogue, descriptive of Engines and Boilers, to take the place of all former ones, which are hereby annulled.

We manufacture ONE CLASS ONLY, the best that can be produced by skilled labor, standard material and machinery of the latest type.

The Engines and Boilers we offer are built entirely in our own shops. For twenty-five years this organization has devoted itself to producing Steam Power *exclusively* of the highest type.

Engines

With a view to maintain the confidence of our many patrons, we need only mention The "Jewel" Automatic Engine, with Rites Governor. Our Vertical Engines, so well known among builders of Concrete Mixer and Centrifugal Pump Machinery, have been improved and refined and will meet the most exacting trade conditions.

Our Horizontal Center-Crank Engine shares in these betterments, and is more popular than ever with creamery, cheese and laundry houses.

Boilers

We shall make every effort to merit our past reputation as builders of the best boiler, price and material being duly considered.

We use flange steel only in the construction of our standard steel Boilers, and they are fitted with full weight charcoal iron, lap-welded tubes of the best American manufacture. The rivets, braces, etc., are also of a strictly high-grade product.

In considering the lives of the large number of men at risk, the manufacturer assumes a grave responsibility, and great care should be exercised in building Boilers to make them safe.

To buy anything but a first-class Boiler is *criminal negligence*.

FREIGHTS.—We deliver all goods F. O. B. cars at our factory, unless otherwise specified, and there our responsibility ceases.

The weights given have been carefully prepared, and are approximately correct.

The lowest freight rates will be secured and shipments traced through to destination.

N. B.—Any delivery promised is contingent upon strikes, accidents, delay by carrier or other causes beyond our control.

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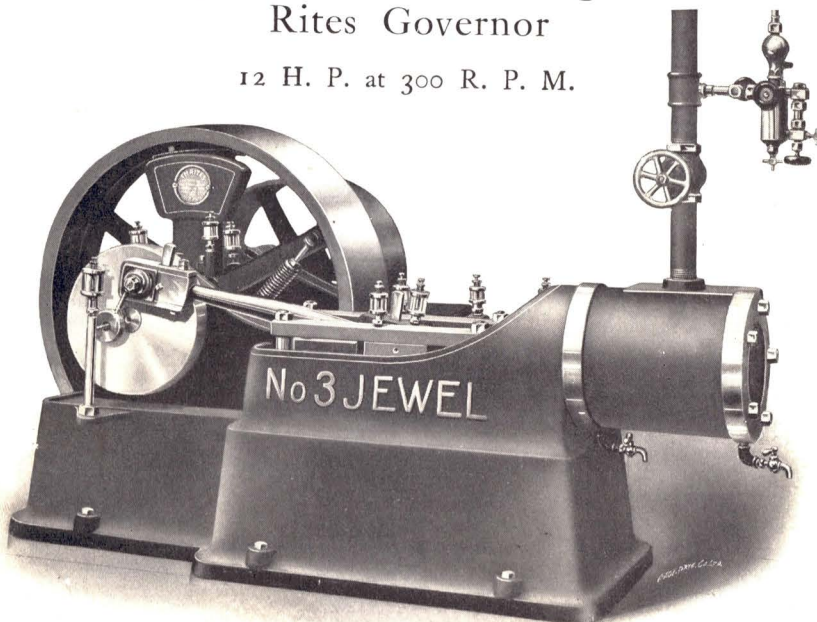
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No. 3 Jewel Automatic Engine with Rites Governor

12 H. P. at 300 R. P. M.



Thousands of these engines are operating successfully in Creameries, Laundries, Factories, Oil Mills, Filing Rooms, Electric Light Plants, etc.

Where silent running, close regulation, economy, durability and reserve power are considerations the JEWEL stands pre-eminently ahead of all other engines for the price.

With modern tools, special machinery and skilled mechanics we produce work that is absolutely uniform. The frame is designed with great care and the metal distributed to stand heavy strain. The connecting rod is a solid steel forging; shaft and wrist-pin, special high carbon, open-hearth steel, pressed into discs with hydraulic pressure, keyed and riveted.

Equipped with the well-known Rites Governing System, and modern type perfectly balanced valve; the governor produces a regulation that is practically perfect, speed being constant with and without a load.

The bearings are ample and lined with first quality babbitt metal. Lubrication unexcelled. The oiling devices, sight-feed oil cups, double connection lubricator, regrinding throttle valve, best that can be obtained.

Every engine thoroughly tested under full steam pressure and with brake load.

Dimensions and Powers of the Jewel Automatic Cut-off Engines

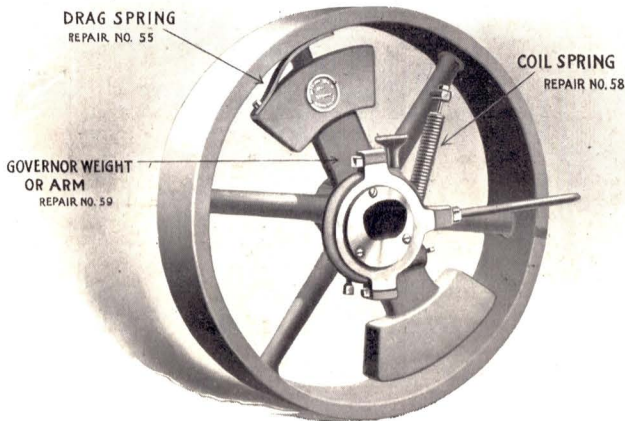
Based on 80 lbs. Initial Pressure, Cut-off at $\frac{1}{4}$ Stroke

TRIMMINGS. — We ship with each Engine a complete set of glass oilers, sight-feed lubricator, one throttle valve and two cylinder cocks.

Engine Number.....	1	2	3	4	5	6	7	8	9	10
Telegraphic Cipher.....	Diamond	Ruby	Emerald	Pearl	Opal	Garnet	Turquoise	Amethyst	Sapphire	Topaz
Horse-Power Rating.....	6 to 8	8 to 10	10 to 12	15 to 18	20 to 25	30 to 35	40 to 45	50 to 55	60 to 65	70 to 75
Revolutions per Minute.	AT 260 260	AT 230 230 320 320	AT 230 230 300 300	AT 220 220 280 280	AT 220 220 260 260	AT 220 220 260 260	AT 200 200 230 230	AT 200 200 225 225	AT 200 200 225 225	AT 200 200 225 225
Cylinder... { Bore.....	4½ in.	5 in.	6 in.	7½ in.	8 in.	9½ in.	10 in.	10 in.	11 in.	12 in.
Steam pipe... { Stroke.....	6 in.	7½ in.	7½ in.	8 in.	10 in.	10 in.	12 in.	15 in.	15 in.	15 in.
Exhaust pipe.....	1½ in.	1½ in.	1½ in.	2 in.	2 in.	2 in.	2 in.	3 in.	3½ in.	4 in.
Fly-Wheel. { Face.....	20 in.	30 in.	30 in.	35 in.	42 in.	42 in.	48 in.	60 in.	60 in.	60 in.
Weight.....	54 in.	63 in.	63 in.	74 in.	94 in.	94 in.	104 in.	13 in.	12 in.	12 in.
Weight.....	135 lbs.	200 lbs.	340 lbs.	435 lbs.	720 lbs.	720 lbs.	750 lbs.	1000 lbs.	1000 lbs.	1300 lbs.
Belt Pulley... { Diameter	14 in.	16 in.	18 in.	20 in.	20 in.	24 in.	24 in.	30 in.	30 in.	30 in.
Face.....	64 in.	74 in.	84 in.	104 in.	124 in.	124 in.	124 in.	124 in.	124 in.	14 in.
Diameter of shaft.....	1½ in.	2½ in.	2½ in.	3 in.	3 in.	3½ in.	3½ in.	3½ in.	4 in.	4 in.
Floor space.....	52 x 36	64 x 38	64 x 38	69½ x 46½	73 x 54	73 x 54	112 x 60	120 x 78	120 x 78	120 x 78
Weight, complete.....	700 lbs.	1200 lbs.	1275 lbs.	1950 lbs.	3200 lbs.	3300 lbs.	4600 lbs.	7000 lbs.	7200 lbs.	7600 lbs.
Cubic ft. boxed for export.	28	59½	59½	92	148	148	234	401	401	401

The sub-base and frame is one solid casting on the Nos. 1, 2, 3 and 4 Engines. Other sizes have frame bolted to sub-base. On crank pin we use center oilers on all sizes. Engines are set to run at the highest speed, when leaving our factory, unless otherwise ordered. All engines are right-hand and run over (top of fly-wheel running away from cylinder). Extra charge made for foundation bolts. Blue prints furnished on application. For instructions covering adjustment of the Rites Governor, valve setting, etc., see page 11.

Rites Inertia Governor



Governor in Fly-Wheel

The well-known Rites Governor used on our Jewel Automatic Engine is a strong, simple, durable governor.

The pin supporting the governor arm is large and made of special pin steel, surrounded by a renewable bronze bushing. Lubricated by a simple compression grease cup.

The fact that this type of governor has been adopted by almost the entire engine trade of the better class, is convincing evidence of its perfection.

Instructions for Operating Rites Governor, Valve Adjusting, Etc.

1. All governors are thoroughly tested before leaving the factory, and, unless otherwise instructed, are set to run at the highest rate of speed shown in catalogue.

2. If run at rate of speed specified, will develop stated horse-power, giving closer regulation with better results than if any material change is made. Therefore, we would advise our customers to make change in speed as far as possible by changing size of belt pulleys.

3. Don't meddle with the governor or change the tension of coil spring. The Rites Governor is "right" when it leaves our hands. You can't improve it.

4. If the governor pounds or engine runs irregularly, it may be traced to one of the following causes:

First: Wrong adjustment of the drag spring that bears on the inside rim of the fly-wheel, being either too tight or too loose. This spring must bear against the rim just enough to hold the engine steady. When necessary to adjust, loosen the screw that holds flat spring on the end of governor arm and slip a small piece of paper or cardboard under the spring on either side of screw, as condition requires.

Second: Governor pin tight or not working freely from lack of lubrication. Remedy: Clean out the pin and bushing with naphtha or kerosene and lubricate thoroughly.

Third: Valve stem may be packed too tight.

Fourth: Valve may get dry from lack of oil.

5. In cases where the governor is of necessity set to run at a low rate of speed, the racing or irregular motion is sometimes due to the drag spring being too tight or too slack. A little adjustment there will give the desired effect.

6. The supporting pin that holds the governor to the wheel **MUST ALWAYS BE THOROUGHLY LUBRICATED**. *Do not overlook this*; for if neglected the pin will wear and stick and give trouble.

7. To increase the speed either loosen the slot-adjusting screw (allowing the stud that holds the spring to the governor to move away from the center of the wheel) or tighten the tension of the spring.

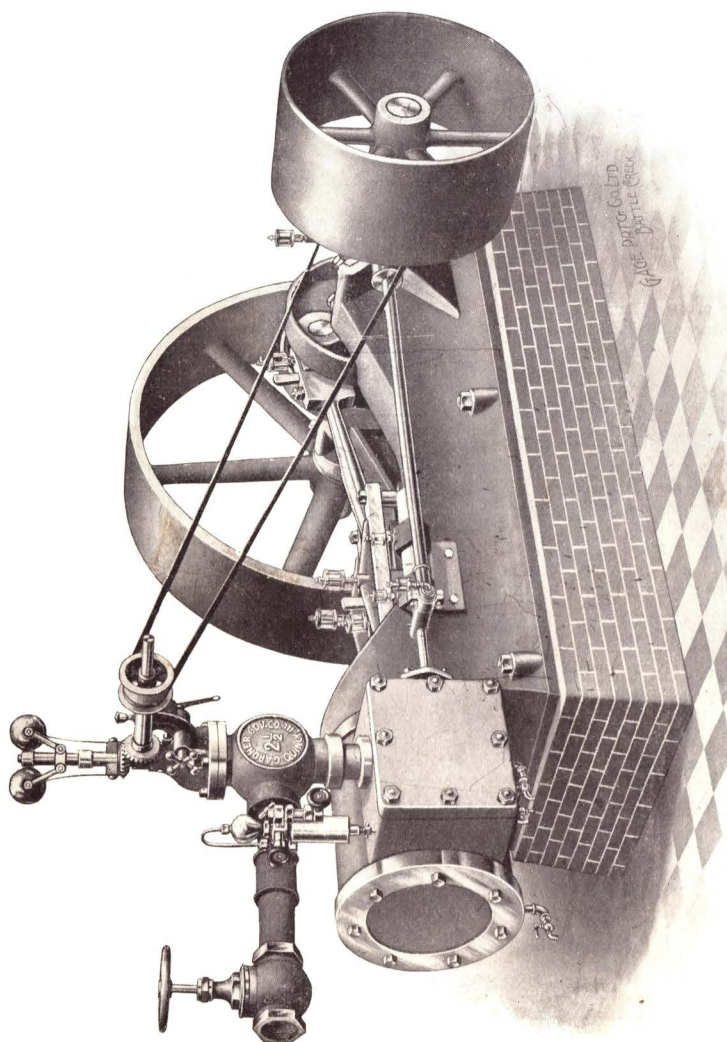
8. To decrease the speed of the governor, either tighten the screw (moving the stud toward the center of the wheel) or loosen the tension of the spring.

9. Set the valve same as any ordinary slide valve and divide it so the opening is the same on both ends when pin is on or near the center. See that valve does not open at either end when governor is blocked clear out.

10. The two bottom corners of the pressure plate are filed off, beveling to match the brackets or lugs in the steam chest on which the pressure plate sets. These two beveled corners should go together, line and line.

11. If the valve becomes slightly worn and allows steam to pass between pressure plate and valve, same can be remedied by using a fine file or scraper and scraping down the chipping strips on the pressure plate just enough so that it will bear evenly on the valve. Care should be taken that it is not too tight, so it will bind. Always see that the jam nuts on either side of the valve are kept just tight enough so that the valve can seat.

12. If necessary to put on new fly-wheel, the key seat cannot be cut at factory. This must be done on the ground where the engine is erected, in order to find where the key-way will be located when the valve is properly set. The operation usually is: Place the fly-wheel on the shaft, then set the valve as directed in paragraph 9. Mark the key-way where it should go in the wheel, then take out shaft and cut key-way in wheel exactly to line.



Horizontal Center-Crank with Throttling Governor

Horizontal Center-Crank Engines

Our horizontal center-crank is a strong, simple, plain engine.

The lower slides, the journal boxes, the center of the Cylinder, the cross-head and the crank shaft bearings are in a direct line, thus relieving the studs which hold the upper slides from all strain, and bring the thrust of the crank bearings directly on the engine bed and not on the studs. Connecting rod solid steel forging; shaft and wrist-pin, special grade open-hearth steel pressed into disc by hydraulic pressure, keyed and riveted. The cylinder, ways and cross-head are of the modern locomotive pattern. The piston has self-adjusting packing rings. The cylinder heads are overhanging and polished. The connecting rods and eccentric rod have adjusting brass boxes.

We justly claim for this Engine large wearing surfaces, durability, great rigidity and strength, extreme simplicity and few parts.

All our engines are run and tested under actual working pressure before shipping, and are known to be in perfect working order.

Rated Horse-Power	4	6	8	10	12	15	20	25	35	40	50
Telegraphic Cipher.....	Ape	Cow	Cat	Dog	Elk	Fox	Pig	Rat	Deer	Bear	Coon
Cylinder { Bore, inches	4	5	6	7 $\frac{1}{2}$	7 $\frac{1}{2}$	8	9 $\frac{1}{2}$	10	10	11	12
Stroke, inches	5	7 $\frac{1}{2}$	7 $\frac{1}{2}$	8	9	10	10	12	15	15	15
Steam pipe, inches.....	3 $\frac{1}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$
Exhaust pipe, inches...	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2	2	2	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4	4 $\frac{1}{2}$
Revolutions per minute.	300	250	200	200	180	180	150	150	150	150	150
Governor pulley { Diam.	4 $\frac{3}{8}$	5 $\frac{3}{8}$	6 $\frac{3}{8}$	9	9	9	9	9	8 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$
Face	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2	2	2	2	2	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$
Fly-wheel { Diam., ins...	17	24	24	30	30	35	40	48	60	60	60
Face, inches.	4 $\frac{1}{2}$	6	6	6 $\frac{1}{2}$	6 $\frac{1}{2}$	7 $\frac{1}{2}$	9 $\frac{1}{2}$	12	12	12	12
Weight.....	65	170	170	180	180	270	420	500	1000	1000	1250
Belt pulley { Diam., ins.	12	14	14	16	18	18	20	24	30	30	36
Face, ins.	5 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{2}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$
Weight, complete, lbs...	380	750	775	1200	1250	1500	2100	3000	4650	4800	5200
Diam. of shaft, inches...	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2 $\frac{1}{4}$	2 $\frac{3}{4}$	2 $\frac{3}{4}$	2 $\frac{3}{4}$	3	3 $\frac{3}{4}$	3 $\frac{3}{4}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$
From foundation top to center of shaft, inches	6 $\frac{1}{2}$	7 $\frac{1}{4}$	7 $\frac{1}{4}$	7 $\frac{1}{4}$	7 $\frac{1}{4}$	7 $\frac{1}{4}$	10	11 $\frac{1}{2}$	13	13	13
Floor space, inches... {	44	62	62	78	79	80	84	96	127	127	127
	x	x	x	x	x	x	x	x	x	x	x
	30	36	36	42	42	42	55	54	74	74	74
Cu. ft. crated for export	13 $\frac{1}{2}$	26	26	37	37	50	74	118	188	188	197

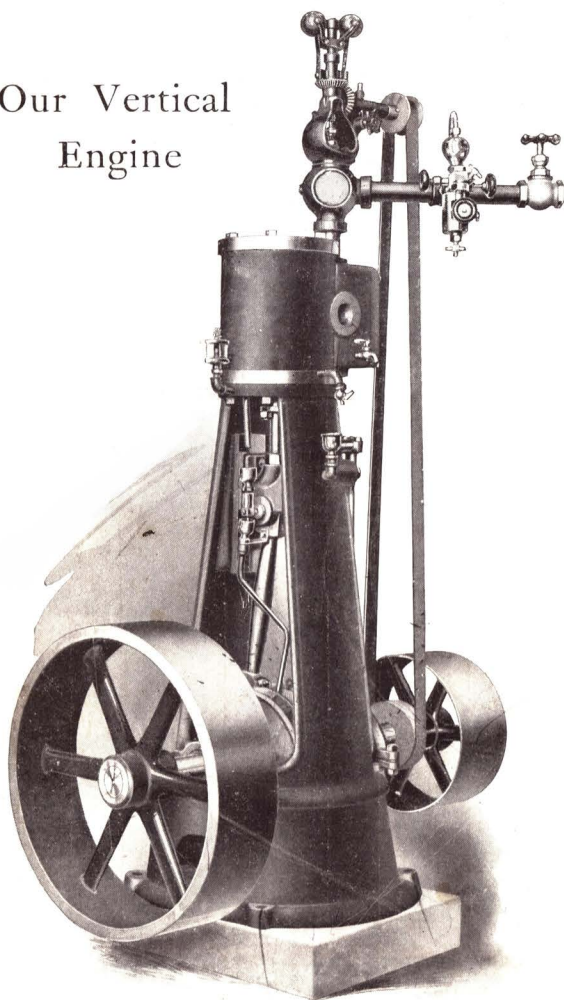
TRIMMINGS.—The above engines include governor, governor pulley and belt, glass oilers, cylinder lubricator, throttle valve and cylinder cocks. On the 25 H. P. and larger sizes, we furnish Class A spring governors with automatic safety stop.

Extra charge made for foundation bolts.

Special size belt pulleys will be furnished at additional cost.

Blue prints furnished on application.

Our Vertical Engine



We are proud of our 1912 Vertical, Long-Stroke Engine—the culmination of twenty-five years' honest effort to produce a plain, powerful, simple engine that will stand up under the most exacting conditions.

The popularity and increasing demand for this line demonstrates its efficiency and reliability.

Vertical Engines

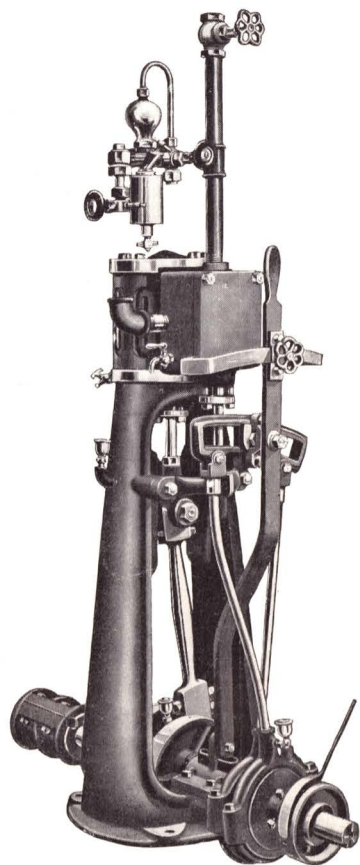
Neat and simple in design, strong and durable in construction. Discs are heavy cast iron. Shaft and wrist-pin best grade of machinery steel, pressed together with hydraulic pressure and keyed. Steel connecting rods. Brasses of best box metal, and all parts of the engine adjustable. High grade standard trimmings furnished. All engines run and tested under actual working pressure.

Dimensions of Vertical Engines

Horse-Power	2	3	4	5	6	8	10	12	15
Telegraphic Cipher.....	Carrot	Turnip	Parsnip	Radish	Cabbage	Squash	Lettuce	Beans	Peas
Cylinder.....	3	3½	4	4½	5	6	7½	7½	7½
Steam pipe, inches.....	5	5	5	5	7½	7½	8	9	10
Exhaust pipe, inches.....	¾	¾	¾	¾	1	1	1	1	1
Revolutions per minute.....	350	350	300	300	250	200	200	180	180
Belt pulley.....	10	10	12	12	14	14	16	18	18
Face, in inches.....	4	4	4½	5	6	6	7	8	8
Governor pulley.....	4	4	4½	5	6	6	7	8	8
Face, in inches.....	1½	1½	1½	1½	1½	1½	2	2	2
Floor space, inches.....	18 x 18	18 x 18	18 x 20	18 x 20	20 x 25	20 x 25	24 x 30	24 x 30	24 x 30
Height to top of cylinder.....	3 ft. 6 ins.	3 ft. 6 ins.	3 ft. 8 ins.	3 ft. 8 ins.	4 ft. 5 ins.	4 ft. 5 ins.	5 ft. 7 ins.	5 ft. 7 ins.	5 ft. 8 ins.
Weight, complete, crated, in lbs.....	320	340	450	475	800	850	1350	1400	1500
Balance wheel.....	15	15	17	17	24	24	30	30	35
Face, in inches.....	4	4	4½	4½	6	6	7	7	7
Diameter of shaft, in inches.....	45	45	65	65	170	170	180	180	200
Cubic feet when crated for export..	14	14	14	14	1½	2½	2½	2½	2½
	16	18½	18½	18½	32	32	54	54	59

TRIMMINGS.—The above include governor, governor pulley and belt, throttle valve, oil cups, cylinder lubricator, belt wheel, balance wheel and air cock.

The 4 H. P. and larger sizes are now fitted with sight feed continuous oiling device for cross-head and crank-pin.



Our Vertical Marine Engine

Constructed with double eccentrics and reversible link attachment, and fitted with compression coupling, starting wheel and bar (no governor, governor pulley, belt wheel, balance wheel, or sub-base furnished). It is thoroughly made, and for service it is equal to any in the market. The material used in its construction is of the best; nothing is accepted until it is rigidly inspected. It is also placed under high steam pressure and run for several hours, and must necessarily stand the test.

We are building them in sizes from one to fifteen (1 to 15) horsepower, inclusive.

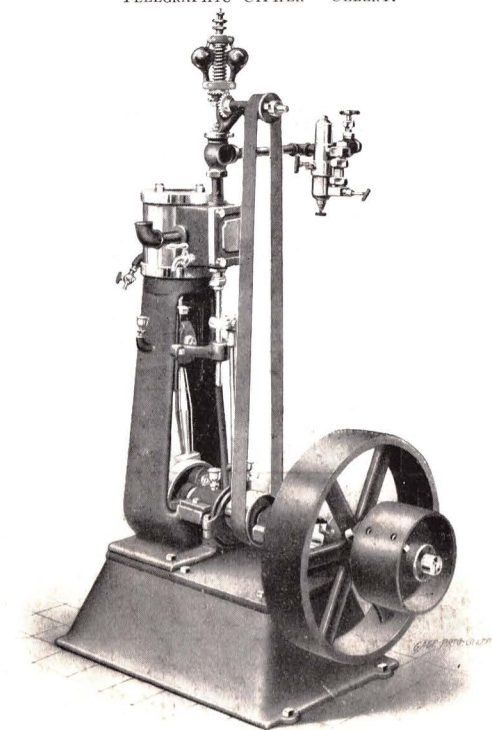
Dimensions of Vertical Marine Engines

Horse-Power	1	2	3	4	5	6	8	10	12	15
Telegraphic Cipher.....	Marine Celery	Marine Carrot	Marine Turnip	Marine Parsnip	Marine Radish	Marine Cabbage	Marine Squash	Marine Lettuce	Marine Beans	Marine Peas
Cylinder—										
Bore, in inches.....	2½	3	3½	4	4½	5	6	7½	7½	7½
Stroke, in inches....	3	5	5	5	5	7½	7½	8	9	10
Steam pipe, inches....	3	4	4	4	4	1	1½	1½	1½	1½
Exhaust pipe, inches..	3	4	4	1	1	1½	1½	2	2	2
From center of shaft to bottom of marine base, inches	4	3	3	2½	2½	2½	2½	4½	4½	4½
Floor space, inches....	14 x 23	18 x 20	18 x 20	18 x 20	18 x 20	20 x 22	20 x 22	22 x 24	22 x 24	22 x 24
Height to top of cylin- der	24 ins.	2 ft. 10 ins.	2 ft. 10 ins.	3 ft. 1 in.	3 ft. 1 in.	3 ft. 9 ins.	3 ft. 9 ins.	4 ft. 11 ins.	5 ft.	5 ft. 1 in.
Shipping weight, lbs...	110	200	250	330	380	600	630	1100	1250	1350
Cubic feet crated for export	6	9	9	10	10	21	21	38	38	38
Diam. of shaft, inches..	1½	1½	1½	1½	1½	1½	2½	2½	2½	2½

TRIMMINGS.—Include throttle valve, oil cups, cylinder lubricator and air cock and fitted with compression coupling, starting wheel and bar. No pulleys, fly-wheel or sub-base furnished.

“Little Giant” Engine, 1-Horsepower

TELEGRAPHIC CIPHER — CELERY.



It is unique in design throughout, compact, and a model of simplicity, and is especially adapted for use in running creamery separators, ice cream machinery and light printing presses.

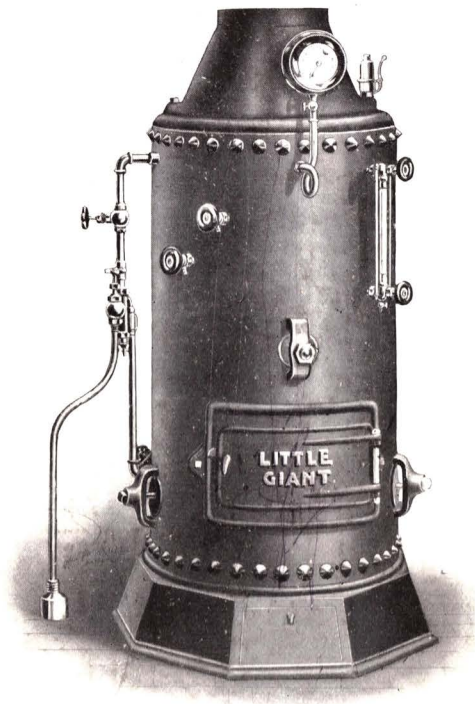
Specifications of “Little Giant” Engine

Cylinder.....	Bore, in inches.....2½	Governor, inch.....3
Revolutions per minute.....	Stroke, in inches.....3	Exhaust, inch.....½
Belt pulley..	400	Floor space, in inches.....14x26
	Diameter, in inches.....6	Weight to top of cylinder, in inches.. 30
	Face, in inches.....3½	Weight, complete, in lbs.....180
Fly-wheel...	Diameter, in inches.....13	Cubic feet when crated for export.... 6
	Face, in inches.....3½	Shipping weight, in lbs.....200
	Weight, in lbs.....35	

When run at 400 revolutions per minute, will develop its full rated horse-power. With each engine we furnish governor, governor pulley and belt, oil cups, throttle valve, cylinder lubricator, belt and balance wheel, complete.

“Little Giant” Boiler, 1 ½-Horsepower

TELEGRAPHIC CIPHER—RED



This Boiler is complete in every detail, and is extensively used where light power is needed. It is made of the best quality of steel and tested at 150 lbs. pressure before leaving the works.

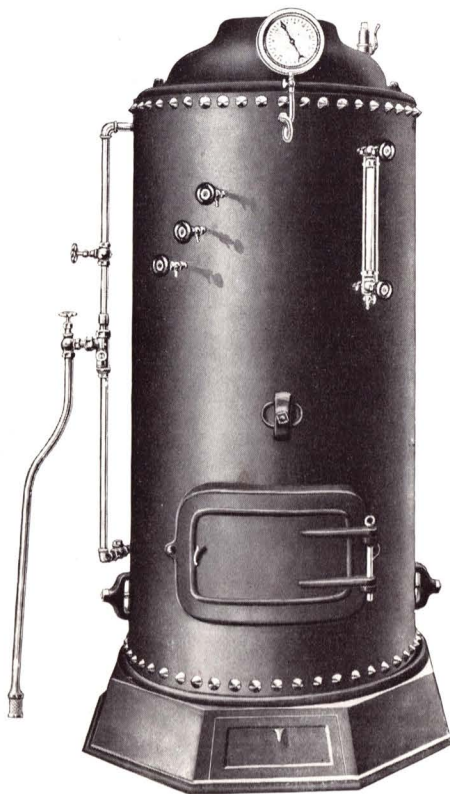
Specifications of “Little Giant” Boiler

Horse-power	1½	Number of 2-inch tubes.....	16
Diameter of boiler, in inches.....	20	Weight of boiler without trimmings or fixtures	325
Height above base, in inches.....	36	Floor space, diameter, in inches.....	30
Diameter of furnace, in inches.....	16	Weight of boiler, complete.....	475
Height of furnace, in inches.....	18	Outside diameter of stack opening, in inches	8½
Thickness of steel in shell.....	3-16	Height from floor to top of hood.....	4 ft. 2 in.
Thickness of steel in heads.....	1	Cubic feet crated for export.....	13½
Thickness of steel in fire box.....	1		
Length of tubes, in inches.....	18		

CASTINGS AND TRIMMINGS.—Hood, door and frame, grates base, injector or feed pump (description and cut on page 35), steam gauge, water gauge, two gauge cocks, safety and blow-off valves.

Vertical Boiler

Flange Steel, with Guaranteed Charcoal Iron Tubes



Our Boilers are made of flange steel 60,000 lbs. tensile strength, and the tubes are full weight, lap welded charcoal iron of the best American manufacture. All Boilers above 26 inches in diameter have vertical seams double riveted, and all sizes are mounted on octagon bases. Fusible plugs in sizes 4 H. P. and upward and stay-bolts in water leg in the 6, 8, 10, 12, 14 and 16 H. P. Boilers. Each Boiler is tested to 150 lbs. hydrostatic pressure, and contains four standard size hand-hole plates for clean-out purposes.

Specifications of Plain Vertical Boilers

Horse-Power	1½	2	3	4	5	6	8	10	12	14	16
Telegraphic Cipher.....	Red	Green	Yellow	Blue	Indigo	Violet	White	Black	Orange	Maroon	Purple
Diameter of boiler, in inches.....	20	20	20	24	24	26	30	30	36	36	36
Height above base, in inches.....	36	43	49	50	60	60	60	72	72	84	96
Diameter of furnace, in inches.....	16	16	16	21	21	22	25	25	30	30	30
Height of furnace, in inches.....	18	18	18	20	20	22	24	24	24	28	32
Thickness of steel in shell.....	3-16	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Thickness of steel in heads.....	¼	5-16	5-16	5-16	5-16	5-16	5-16	¾	¾	¾	¾
Thickness of steel in fire box.....	¼	¼	¼	¼	¼	¼	¼	¼	5-16	5-16	5-16
Length of tubes, in inches.....	18	25	31	30	40	38	36	48	48	56	64
Number of 2-inch tubes.....	16	19	19	31	31	37	43	43	55	55	55
Weight of boiler without trimmings or fixtures.....	325	430	530	640	750	840	1010	1180	1520	1800	2280
Weight of boiler, complete.....	475	560	620	880	1060	1300	1550	1650	2350	2540	3000
Size of pop safety valve, in inches....	¾	¾	¾	¾	¾	1	1	1½	1½	1½	1½
Outside diameter of stack opening, inches.	8½	8½	8½	10	10	11	12½	12½	16	16	16
Height from floor to top of hood, in inches	50	54	60	66	76	76	76	94	98	108	120
Cubic feet when crated for export.....	13½	15	16½	26	30	35½	42	48½	69	78	87

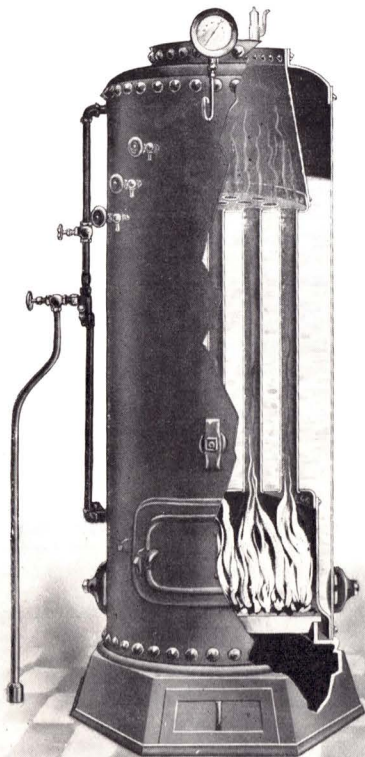
CAST FIXTURES.—Base, hood, fire door and grates.

TRIMMINGS.—Injector fitted with pipe and valves, steam gauge, water gauge, gauge cocks, safety valve and blow-off; all guaranteed to fit perfectly, as every boiler is assembled completely before shipment.

No stack furnished with vertical boilers except at extra cost, depending upon number of feet required.

Submerged Flue Tubular Boiler

Sectional View



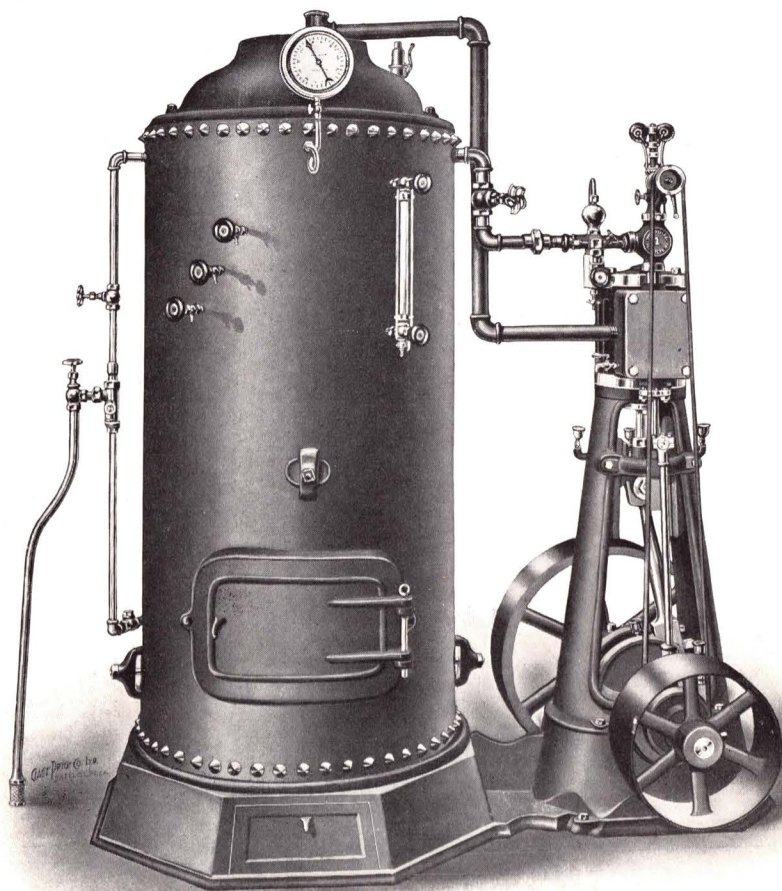
This type of Boiler made throughout of 60,000 lbs. tensile strength flange steel, and is so constructed that the water line is above the tubes. The tops of the tubes, instead of being above the water, are submerged, thus removing any tendency to burn by overheating. Guaranteed charcoal iron tubes; double riveted seams; stay-bolts and fusible plugs same as in our plain Vertical Boilers.

Each Boiler tested to 150 lbs. hydrostatic pressure, and contains four standard size hand-hole plates for clean-out purposes. Mounted on octagon base.

Specifications of Submerged Flue Tubular Boilers

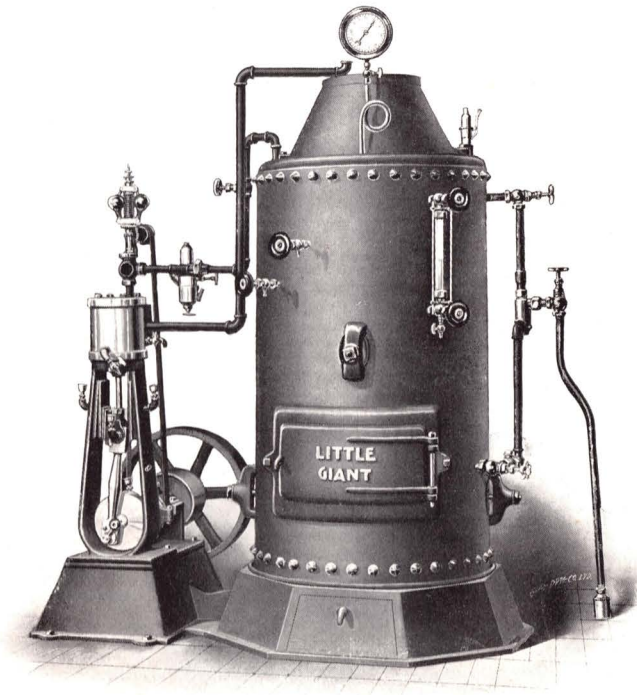
Horse-Power	5	8	10	12	15
Telegraphic Cipher.....	Chestnut	Oak	Walnut	Beech	Hickory
Diameter, in inches.....	24	30	30	30	36
Height, in inches.....	60	60	72	84	84
Height of fire box.....	20	24	24	24	28
Number of tubes.....	31	54	54	54	70
Diameter of tubes, in inches.....	2	2	2	2	2
Length of tubes, in inches.....	22	22	31	42	40
Thickness of shell.....	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{2}$
Thickness of fire box.....	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{5}{16}$
Thickness of heads.....	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$
Thickness of cone.....	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{5}{16}$
Size of safety valve, in inches.....	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$
Size of blow-off, in inches.....	$\frac{3}{4}$	1	1	1	1 $\frac{1}{4}$
Diameter of stack opening, in inches.....	11 $\frac{1}{2}$	15 $\frac{1}{2}$	15 $\frac{1}{2}$	15 $\frac{1}{2}$	18
Weight of boiler without fixtures.....	800	1075	1350	1550	2030
Weight of boiler, complete.....	1020	1500	1700	2000	2700
Cubic feet when crated for export.....	30	42	48 $\frac{1}{2}$	55	78

FIXTURES for the above include grates and doors, fitted with steam gauge, water gauge, gauge cocks, safety valve and blow-off valve and injector. All guaranteed to fit, as our boilers are assembled completely before shipment. No stack furnished with Vertical Boilers, except at extra cost, depending on number of feet required.



Our Combined Vertical Engine and Boiler

The above illustrates our Combined Vertical Engine and Boiler, trimmed and piped complete, built in any size boiler from $1\frac{1}{2}$ H. P. to 16 H. P. and engine 2 H. P. to 15 H. P. See specifications, pages 15 and 21. We always furnish on independent bases unless otherwise ordered, but we make no extra charge for combining on one base when desired.



Combined Little Giant Engine and Boiler

This cut shows how the "Little Giant" Engine and "Little Giant" Boiler (see description, pages 18 and 19) appear when mounted on a combined base.

The Boiler will produce $1\frac{1}{2}$ H. P., the Engine 1 H. P. and the outfit is complete in every detail. Constructed of standard material throughout, tested and inspected with the same rigid care that obtains throughout our shops.

The name "Little Giant" applies to this outfit only, and the engine stands on the left-hand side of the Boiler as you face the fire-door.

Horizontal Stationary Tubular Boiler

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STATIONARY TUBULAR BOILER



Cut showing our 20 H. P. Horizontal Shell and larger sizes, constructed of 2 sheets with girth seam in center. These boilers are made of flange steel, 60,000 lbs. tensile strength, and the tubes are full weight, lap-welded charcoal iron, of the best American manufacture. High-grade standard fittings and trimmings.

Specifications of Stationary Tubular Boilers

Horse-Power	Telegraphic Cipher	Size of Boiler	Number of 3-In. Tubes	Thickness of Shell, Inches	Thickness of Head, Inches	Diameter Size of Dome, Inches	Grate Surface, Inches	Length of Stack, Feet	Diameter of Stack, Inches	Size of Pop Safety Valve, Inches	Size of Feed Pipe, Inches	Size of Blow-Off Pipe, Inches	Approx. Weight Boiler Complete	Approx. Weight Bare Shell with Lugs
8	Wisp.....	30 x 5	20	$\frac{3}{8}$	5-16	16 x 16	30 x 30	24	14	1	1	1	2800	1400
10	Wit.....	30 x 7	20	$\frac{3}{8}$	5-16	16 x 16	34 x 30	24	14	1	1	1	3100	1600
12	Woe.....	30 x 8	20	$\frac{3}{8}$	5-16	16 x 16	34 x 30	24	14	1	1	1	3300	1800
15	Wood.....	36 x 8	26	$\frac{3}{8}$	9-16	22 x 20	36 x 36	24	16	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	4300	2350
20	Worm.....	36 x 10	28	$\frac{3}{8}$	9-16	22 x 20	36 x 36	24	16	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	4800	2800
25	Wail.....	36 x 12	30	$\frac{3}{8}$	9-16	22 x 20	36 x 48	24	16	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	5700	3550
30	Wain.....	42 x 10	40	9-32	9-16	24 x 24	42 x 42	30	20	2	1 $\frac{1}{2}$	1 $\frac{1}{2}$	7400	4000
35	Wake.....	44 x 10	44	5-16	9-16	24 x 24	44 x 48	35	20	2	1 $\frac{1}{2}$	1 $\frac{1}{2}$	8000	4500
40	Walk.....	44 x 12	44	5-16	9-16	24 x 24	44 x 48	40	20	2 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	9000	5000
45	War.....	48 x 12	48	5-16	9-16	28 x 28	48 x 48	40	24	2 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	10000	5700
50	Wash.....	48 x 14	50	5-16	9-16	28 x 28	48 x 54	40	24	2 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	11500	6900

BOILER FIXTURES.—Full or half front with liners for fire brick, grates, grate bearers, supporting bars for turning arch at rear end of boiler, ash door and frame. Smoke-stack, including guy wire four times length of stack, and all sizes made from No. 16 gauge steel.

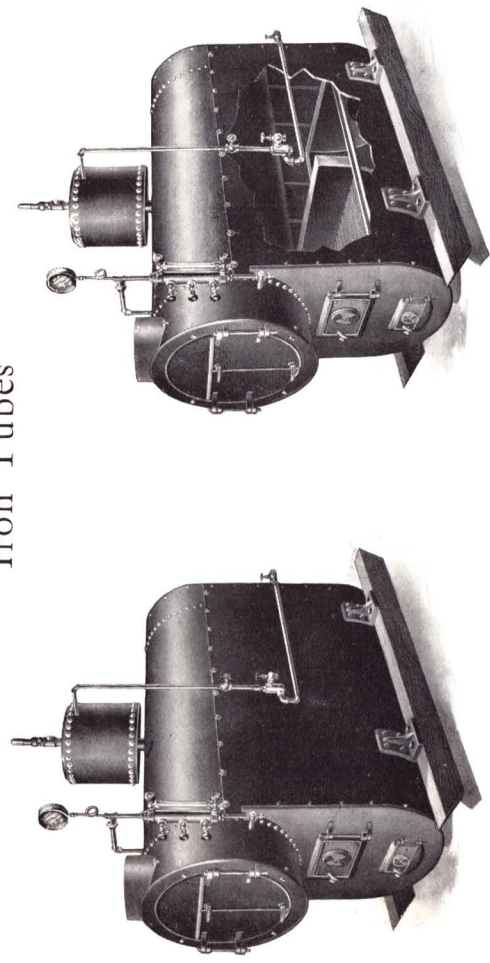
BOILER FITTINGS.—Injector fitted with pipe, safety valve, steam gauge, glass water gauge fitted with water column, gauge cocks, blow-off and check valve.

The 40, 45 and 50-horsepower boilers are constructed with flush ends. All other sizes are made with smoke box extension, as shown in cut. Suitable manhole in all boilers above 20 H. P.

Rucksays and cross rods, wall plates and rollers are furnished only when specified, at additional charge.

All boilers tested to 150 lbs. hydrostatic pressure before leaving the shop.

Ideal Economist Boiler with Guaranteed Charcoal Iron Tubes



An All-Steel Horizontal Boiler Mounted on Skids, Bricked in and Ready for Operating

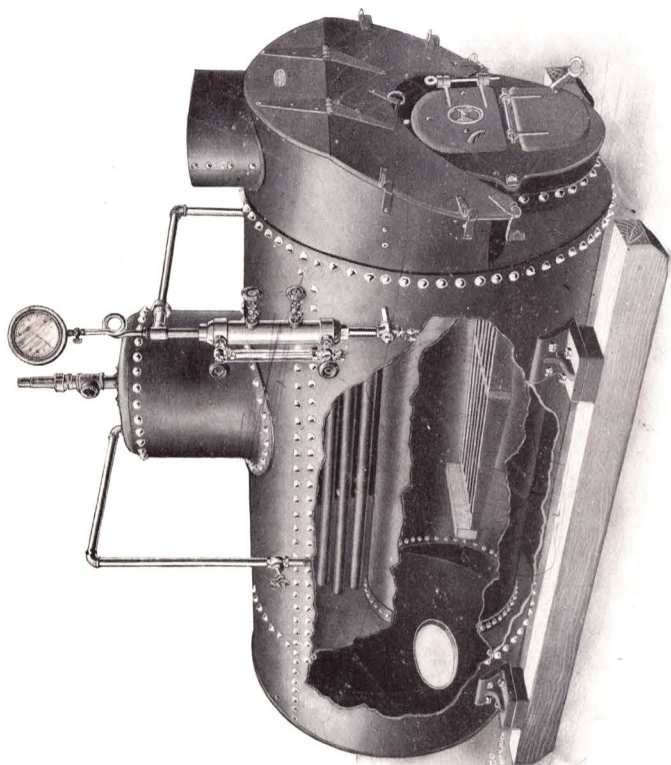
Designed for work requiring moderate power in a small compass. The fire box is furnished with a full set of fire brick, which forms a complete lining.
It is made of flange steel of 60,000 lbs. tensile strength, and is built for service.
Securely braced and stayed; all longitudinal seams above 6 H. P. are double riveted.
It is compact, and in point of economy in the use of fuel is a very desirable and convenient Boiler.
All sizes have double flue door, as shown in cut.
Every Boiler rigidly inspected and tested to 150 lbs. hydrostatic pressure.

Specifications of Ideal Economist Boilers

Horse-Power	4	5	6	7	8	10	12	15	20
Telegraphic Cipher.....	Cloth	Woolen	Linen	Cambrie	Gingham	Calico	Cotton	Muslin	Velvet
Diameter of shell, inches.....	26	26	26	30	30	30	30	36	36
Length of tubes, feet.....	3	4	5	5	6	7	8	7	9
No. of 3-inch tubes.....	15	15	15	22	22	22	22	28	30
Thickness of shell, inches.....	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
Thickness of heads, inches.....	5-16	5-16	5-16	5-16	5-16	5-16	5-16	$\frac{3}{8}$	$\frac{3}{8}$
Length grates, inches.....	24	24	24	24	30	30	30	36	36
Width grates, inches.....	20	20	20	24	24	24	24	29	29
Size pop safety valve, inches.....	$\frac{3}{4}$	$\frac{3}{4}$	1	1	1	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$
Size blow-off valve, inches.....	$\frac{3}{4}$	$\frac{3}{4}$	1	1	1	1	1	1 $\frac{1}{4}$	1 $\frac{1}{4}$
No. of fire brick or tile lining.....	10	12	14	14	16	18	20	20	24
Size of fire brick or tile lining, inches.....	12 x 22	12 x 22	12 x 22	12 x 24	12 x 24	12 x 24	12 x 24	12 x 24	12 x 24
Weight of fire brick or tile lining.....	500	600	700	800	900	1025	1150	1100	1350
Length of stack, feet.....	20	20	20	24	24	24	24	24	24
Diameter of stack, inches.....	12	12	12	14	14	14	14	16	16
Shipping weight, complete.....	2500	2700	3200	3770	4200	4600	5200	5750	6800
Height from floor to top of boiler shell, inches.....	56	56	56	67	67	67	67	72	72
Height from floor to top of dome, inches.....	75	75	75	88	88	88	88	96	96

With These Boilers the Following Fixtures and Fittings are Furnished :

Smoke box extension, door and stack saddle, grate bars, bearing bars, bridge wall, fire brick lining, pop safety valve, steam gauge and siphon water column with glass water gauge, two gauge cocks; feed, check and blow-off valves; injector, fitted to boiler, smoke-stack and guys four times length of stack. Detachable domes enable convenient loading in box-cars, as well as economy in freight charges.



Internal Furnace Boiler

The above cut represents our Internal Furnace Boiler. It is self-contained and constructed with a large flue running lengthwise through it, forming the fire box, which is entirely surrounded by water space. These boilers occupy small space, are economical in first cost and coal consumption. They are securely braced and stayed and all longitudinal seams are double riveted. Made of 60,000 lbs. tensile strength flange steel and the tubes are guaranteed charcoal iron.

Internal Furnace Boilers

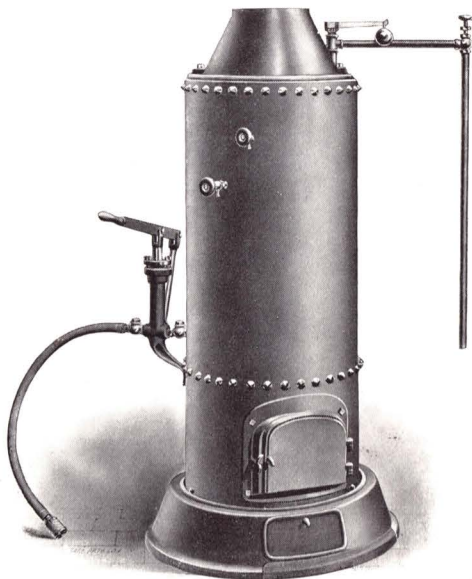
Specifications

Horse-Power	15	20	25	30
Telegraphic Cipher.....	Clover	Smilax	Crocus	Thistle
Diam. and length of shell, inches.....	44 x 90	48 x 102	54 x 96	54 x 114
Thickness of shell, inches.....	$\frac{1}{4}$	5-16	5-16	5-16
Thickness of heads, inches.....	$\frac{3}{8}$	7-16	7-16	7-16
Diam. and length of fire-box flue, inches.	22 x 72	24 x 84	26 x 78	26 x 96
Thickness of fire-box flue, inches.....	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{7}{16}$
Number of 3-inch tubes.....	28	32	44	44
Length of 3-inch tubes, inches.....	72	84	78	96
Diam. and height of dome, inches.....	20 x 16	24 x 16	26 x 20	26 x 20
Diam. of stack, inches.....	16	16	18	20
Length of stack, feet.....	30	30	30	30
Weight, pounds.....	4200	5600	6600	7300
Pop safety valve, inches.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2

These Boilers are mounted on skids, and are fitted with grate bars and breeching. The trimmings include water column, with glass water gauge, gauge cocks and steam gauge, pop safety valve and blow-off valve, and suitable injector fitted to boiler.

Smoke-stack not furnished, except at extra cost, depending on number of feet required.

The Eureka Boiler or Steam Feed Cooker



Size No.	Telegraphic Cipher	Diam. of Shell	Height of Shell	No. of 2-in. Flues	Length of Boiler over All	Shipping Weight	Cubic Ft. Crated for Exp't	Capacity
1	Short	19 ins.	40 ins.	9	54 ins.	350 lbs.	13½ c. ft.	21 gals.
2	Long	19 ins.	44 ins.	13	58 ins.	400 lbs.	14 c. ft.	25 gals.

The trimmings include two gauge cocks, blow-off valve, pump for supplying the boiler with water, safety valve, 2 feet 6 inches suction hose, three feet steam pipe with valve to convey steam to barrel for cooking feed or boiling water.

INSTRUCTIONS FOR PUTTING ON TRIMMINGS.—When you are facing the Boiler in front you will find in the top head a hole for the steam pipe opening, and which also serves for the safety valve connection. A few inches lower in the shell and a little to the left of the door are two holes near together, one above the other, for two gauge cocks. On back side of boiler near the base is a hole in the shell for blow-off valve.

We wish to call your attention to the fact that one of the strongest points of the Eureka Boiler is that it is furnished with a force pump, so the operator may put water in at any time without letting down steam and stopping the progress of the cooking.

The Eureka Boiler or Steam Feed Cooker

Having long seen the need of a good, reliable farm boiler for cooking feed, heating water, etc., we have put upon the market our Eureka Boiler or Steam Feed Cooker, made from boiler steel with regular boiler tubes, making it durable, rigid and strong in all its parts; and being well riveted and calked, will last, with ordinary care, a lifetime. While we test these boilers at 100 lbs. hydraulic pressure, they are intended for use only where low pressure is required.

These boilers are provided with grates, which adapts them to the burning of all kinds of fuel, such as coal, wood, corn cobs, etc.

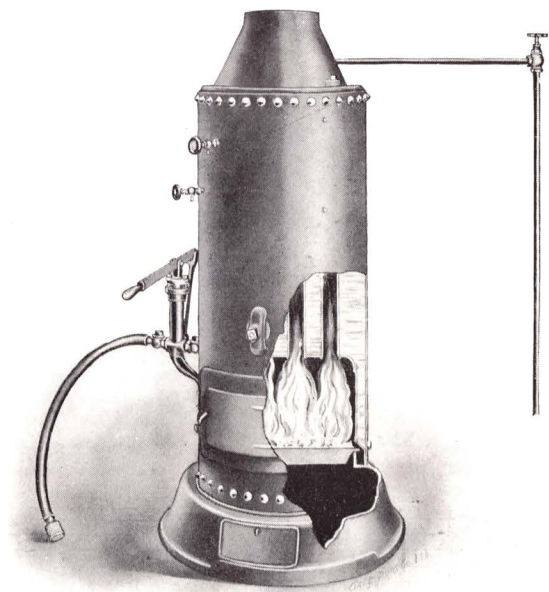
The Eureka Steam Boiler will cook or steam any kind of feed placed in a barrel or vat, with but little care and without danger of burning, thus overcoming the objections to a kettle or caldron. It will steam *moldy hay and corn* perfectly sweet; steam *dry cornstalks and straw* so they will become soft and palatable, and *cook potatoes* so as to render them digestible and valuable for feed. It will also enable a farmer to *save one-third to one-half of his corn* and other feed and at the same time make his *stock thrive better*. It will *save labor in feeding* rather than increase it, as stock fatten much faster when their food is cooked.

In addition to the above, the Eureka Boiler can be used for heating water for a variety of purposes, for steaming casks and milk cans, steaming wood for bending, heating cheese vats, steaming wheat, etc.

DIRECTIONS FOR USING EUREKA BOILERS.—Pump enough water into your boiler so the top gauge cock will, by trying, show water, but no more. *In firing up your boiler never build a quick, hot fire, as by so doing you are liable to heat the top end of the flues before the steam rises, causing them to leak; but build a slow fire, which will prevent this trouble. This is important, as the best boilers can be ruined very soon in this way.* Grates are liable to be burned out very quickly by allowing the ashes to accumulate underneath. Keep your ash pit clean. Run the steam pipe down to the bottom of the vessel, that the contents may receive full benefit.

CAUTION.—Do not unscrew nut "I" on check valve "G" (see cut, page 35) when there is steam pressure on the boiler. The Eureka Boiler is tested at 100 lbs. hydrostatic pressure, but should not be used at as high a pressure as that, as it is intended only for a low-pressure boiler. The safety valve should blow off at about 40 lbs.

No. 3 Eureka Boiler with Water Leg



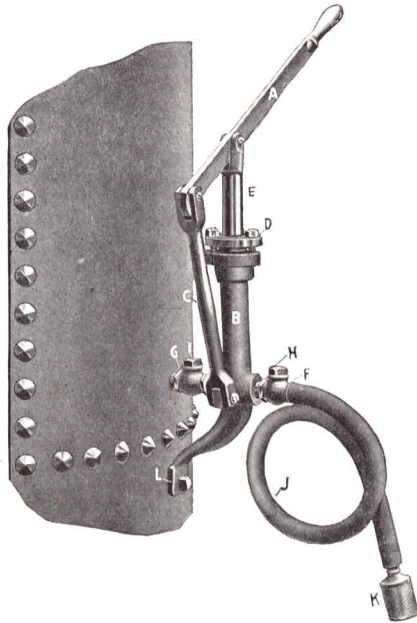
Sectional View No. 3 Eureka Boiler

The above cut represents our No. 3 Boiler, built with water leg, so that the fire box is surrounded by water like a regular vertical boiler. This size has hand-hole plate over the fire door and two washout plugs at the bottom of water leg for cleaning out, and is tested to 150 lbs. cold water pressure, and will produce $1\frac{1}{2}$ horse-power.

SIZE NO.	CIPHER	Diameter of Shell	Height of Shell	Diameter of Fire Box	Height of Fire Box	No. of 2-in. Tubes	Length of 2-in. Tubes	Length of Boiler over all	Shipping Weight	Capacity
3	Stout....	19 ins.	44 ins.	15 ins.	17½ ins.	13	27 ins.	58 ins.	450 lbs.	30 gals.

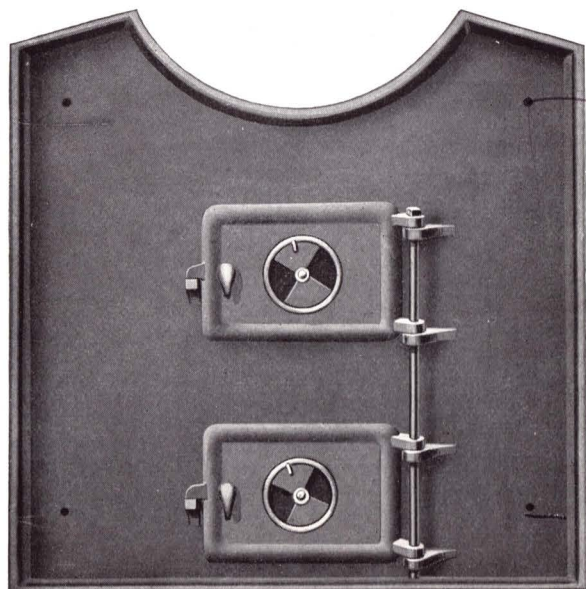
The trimmings include two gauge cocks, blow-off valve, pump for supplying the boiler with water, safety valve, 2 feet 6 inches suction hose, 5 feet 6 inches steam pipe with valve to convey steam to barrel or vat for cooking feed or boiling water. We can furnish steam gauge and water gauges with glass complete, if desired, at a small additional cost.

Boiler Feed Pump

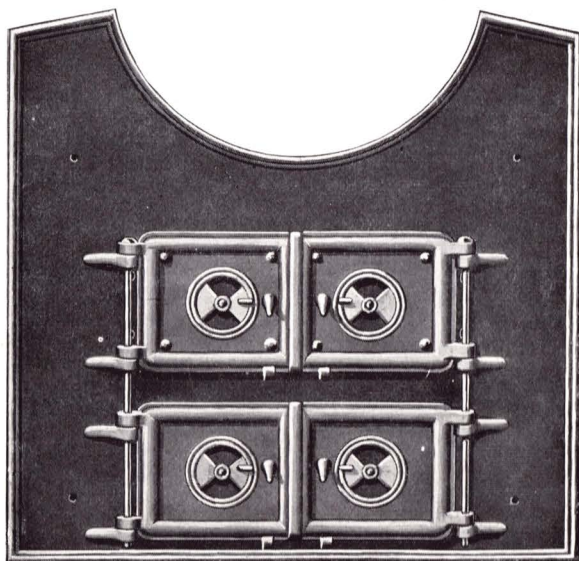


DIRECTIONS FOR ATTACHING THE PUMP.—Start the thread of the check valve “G” in the boiler and screw in by turning pump carefully so as not to strip the thread on the check valve. Screw it down tight enough so that there will be no leak, taking care not to twist off the valve thread. Screw in cap screw “L,” drawing brace against boiler tightly, but not tight enough to break it.

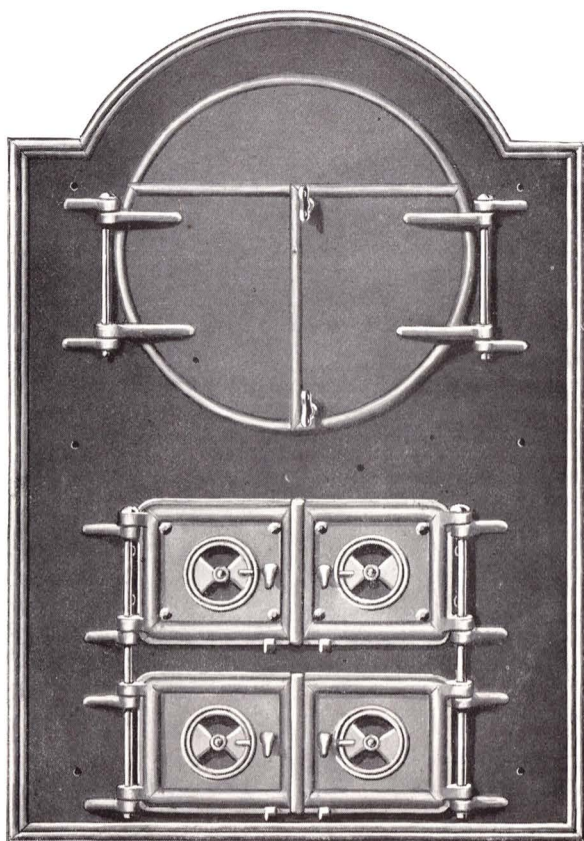
DIRECTIONS FOR CLEANING PUMP.—A very small particle of dirt in the check valves “F” or “G” will stop the pump from working. To remove the dirt unscrew the nuts “H” and “I” and wipe out the seat. A screen is fitted to the end of the hose to keep dirt out, as dirty water will stop the valves very quickly. Keep the screen clean. Stuffing-box “D” can be tightened if pump leaks at top, and when packing is worn out can be repacked with candle wicking or hemp.



35-inch Half Front with Single Doors

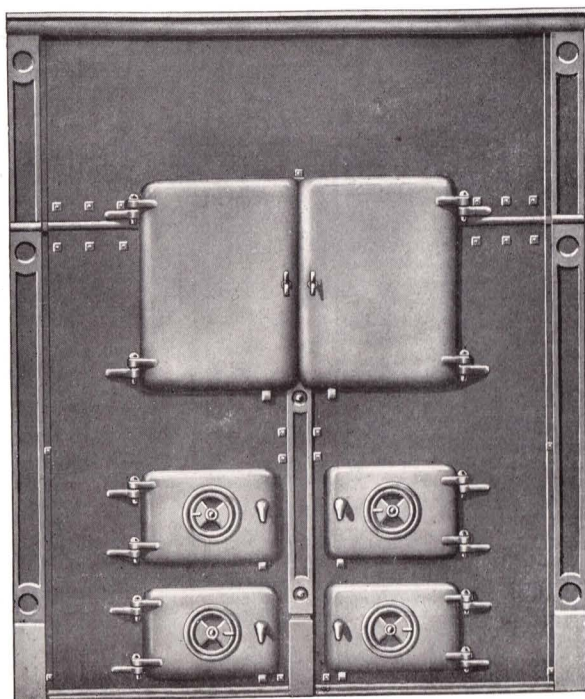


36-inch Half Front with Double Doors

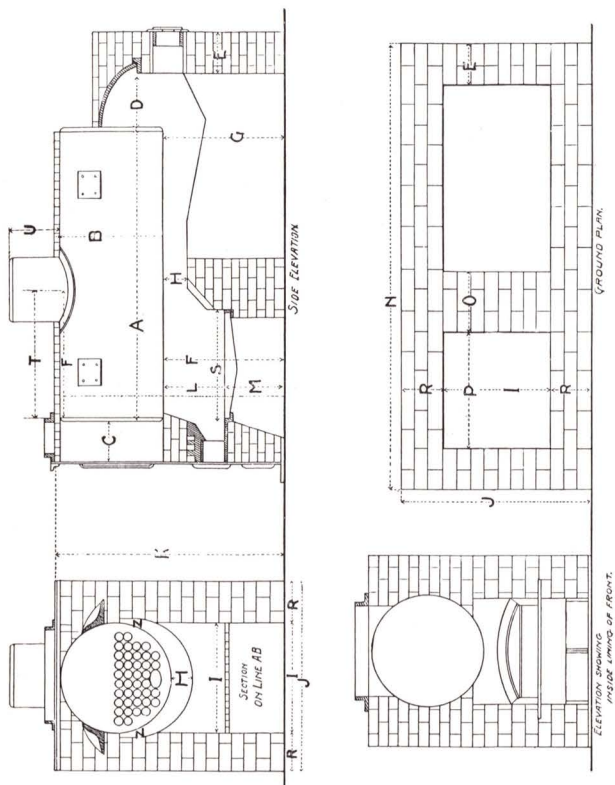


36-inch Full Flush Front

The 30-inch Full Flush Front has single Fire Doors, same as
30-inch Half Front



42-, 44- and 48-inch Full Flush Front

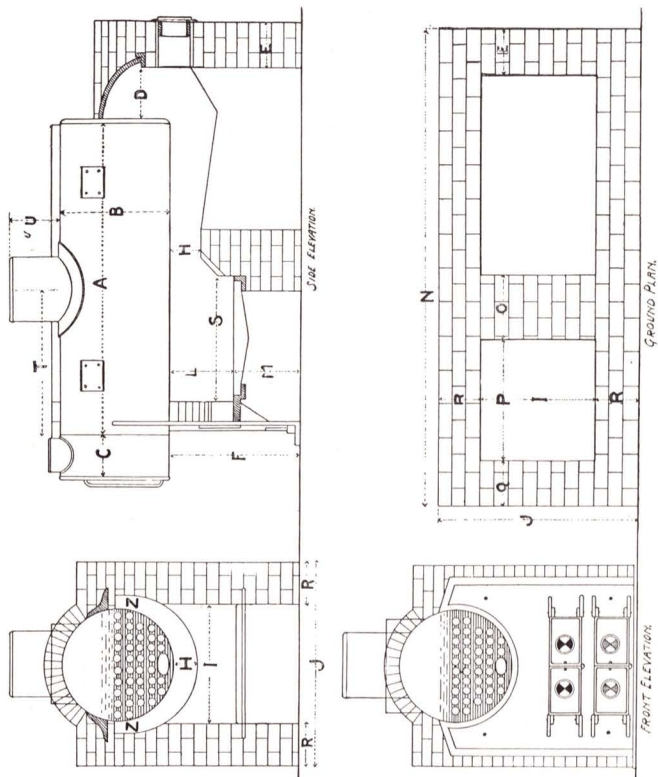


Full Flush Front, Setting, No. 1

Measurements for Setting Tubular Stationary Boilers

With Full Flush Fronts

SETTING PLAN NO. 1																				
Reference Letters on Diagram																				
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U



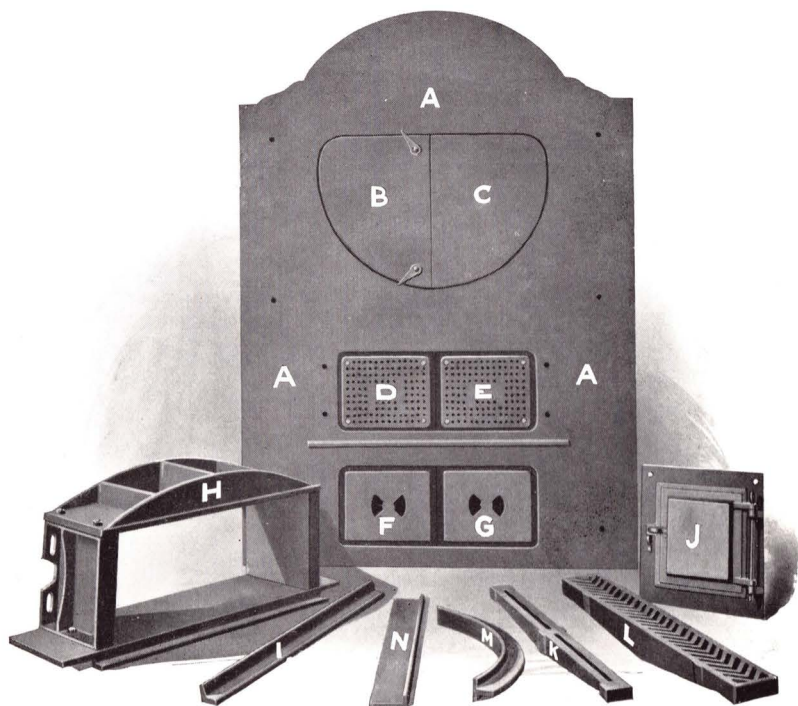
Half Arch Front, Settings, No. 2

Measurements for Setting Tubular Stationary Boilers With Half Arch Fronts

HALF ARCH FRONT SETTING

43

Horse-Power		SETTING PLAN NO. 2																			Common Brick	Fire Brick	Fire Brick to Bridge Wall								
		Reference Letters on Diagram																													
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S				T	U	Z					
8	10	12	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	
Fl.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
5	30	12	18	15	39	7	30	60	17	22	8-3	22	27	12	15	30	30	16	3	400	3400	275	275	315	350	380	400	425	450	475	500
7	30	12	18	15	39	7	30	60	17	22	10-3	22	31	12	15	34	36	16	3	500	4400	275	275	315	350	380	400	425	450	475	500
8	30	12	18	15	39	7	30	60	17	22	11-3	22	31	12	15	34	36	16	3	550	4600	315	315	355	390	420	440	465	490	515	540
8	36	12	18	15	39	8	36	76	20	19	11-3	25	33	12	20	36	36	20	3	600	4800	350	350	390	420	450	470	495	520	545	570
10	36	12	18	15	39	8	36	76	20	19	13-3	25	33	12	20	36	36	20	3	650	5400	390	390	430	460	490	510	535	560	585	610
12	36	12	18	20	39	8	36	76	20	19	15-8	25	33	12	20	42	42	20	3	750	6200	390	390	430	460	490	510	535	560	585	610
30	10	42	12	24	20	43	8	42	82	23	20	14-3	28	38	18	20	42	33	24	3	750	7000	375	375	415	445	475	500	525	550	575
35	10	44	12	24	20	43	9	44	84	23	20	14-3	30	44	18	20	48	36	24	4	800	8300	400	400	440	470	500	525	550	575	600
40	12	44	12	24	20	43	9	44	84	23	20	16-3	30	44	18	20	48	42	28	4	850	9000	425	425	465	495	525	550	575	600	625
45	12	48	14	24	24	45	9	48	96	24	21	16-7	36	44	18	24	48	42	28	4	1000	11800	500	500	540	570	600	625	650	675	700
50	14	48	14	24	24	45	10	48	96	24	21	18-7	36	49	18	24	54	42	28	4	1000	13000	500	500	540	570	600	625	650	675	700



Showing Back View of a 36-inch Full Flush Front and the Castings or Fixtures Used in Connection with Same

A—Is the bare front casting.
 B—Right-hand flue door.
 C—Left-hand flue door.
 D—Right-hand fire door with
 perforated lining.
 E—Left-hand fire door with
 perforated lining.
 F—Right-hand ash door.

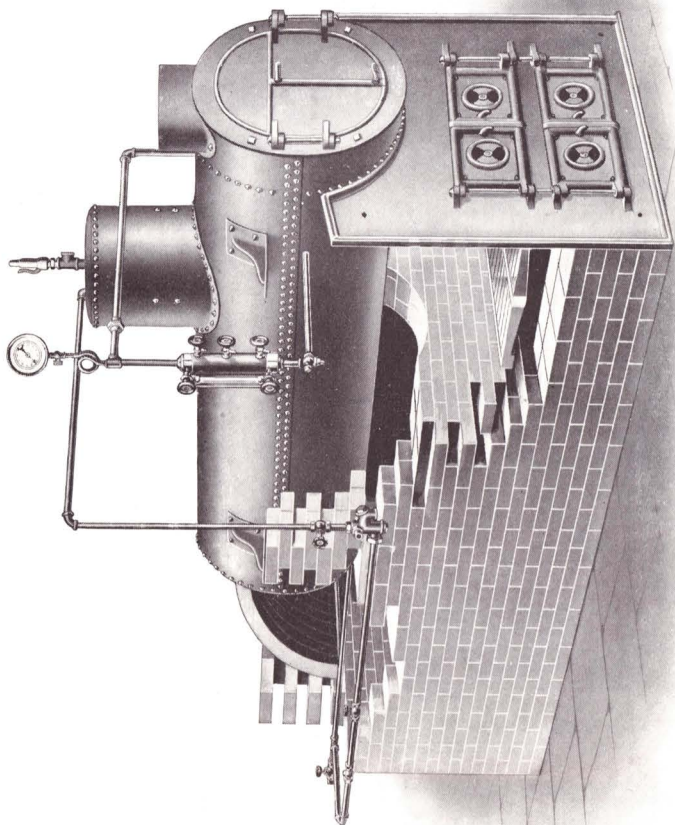
G—Left-hand ash door.
 H—Fire arch, complete. (See note.)
 I—Back grate rest.
 J—Soot or clean-out door and frame.
 K—Common grate bar.
 L—Tupper grate bar.
 M—Rear arch bar or circle.
 N—Rear arch bar or circle rest.

NOTE.—The fire arch for 36-inch full or half front boiler consists of the top, two side castings and front grate rest bolted together. On all other sizes it is a $\square$ shape casting only. See illustrations, page 49.

Table Showing Approximate Weight of Castings for Full Front Horizontal Boilers

Diameter.....	30 Ins.	30 Ins.	36 Ins.	42 Ins.	44 Ins.	44 Ins.	48 Ins.	48 Ins.
Horse-Power ...	8	10-12	15-20	25	30	35	40	45
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Bare front.....	410	410	510	510	1000	1000	1000	1120
Flue doors.....	2 Pcs. 51	2 Pcs. 51	2 Pcs. 89	2 Pcs. 89	2 Pcs. 190	2 Pcs. 190	2 Pcs. 190	2 Pcs. 280
Fire doors.....	Door 28, Liner 11	2 Doors 61, 2 Liners 22	2 Doors 61, 2 Liners 22	2 Doors 55, 2 Liners 43	2 Doors 55, 2 Liners 43	2 Doors 55, 2 Liners 43	2 Doors 103, 2 Liners 51	2 Doors 103, 2 Liners 51
Ash doors.....	28	26	2 Pcs. 61	2 Pcs. 61	2 Pcs. 55	2 Pcs. 55	2 Pcs. 55	2 Pcs. 103
Fire arch.....	70	70	Top 128, Sides 66, Feet 67	Top 128, Sides 66, Feet 67	2 Arches 125, 135, 147 ins.	2 Arches 125, 135, 147 ins.	2 Arches 125, 135, 147 ins.	2 Arches 125, 135, 147 ins.
Front grate rest.....	52	52	12 Pcs. 324	12 Pcs. 324	140	140	140	140
Grates.....	10 Pcs. 259, 3x20 ins.	10 Pcs. 259, 3x24 ins.	12 Pcs. 324, 3x26 ins.	12 Pcs. 324, 3x28 ins.	14 Pcs. 342, 3x28 ins.	15 Pcs. 348, 3x28 ins.	15 Pcs. 348, 3x28 ins.	16 Pcs. 348, 3x28 ins.
Back grate rest.....	15	15	25	25	49	49	49	49
Circle bars.....	5 Pcs. 95	5 Pcs. 95	6 Pcs. 114	6 Pcs. 114	7 Pcs. 133	7 Pcs. 133	7 Pcs. 133	7 Pcs. 133
Circle bar rests.....	2 Pcs. 40	2 Pcs. 40	2 Pcs. 44	2 Pcs. 44	2 Pcs. 95	2 Pcs. 95	2 Pcs. 95	2 Pcs. 95
Soot door.....	16	16	16	16	28	28	28	28
Soot door frame.....	17	17	17	17	36	36	36	36
Hood.....	18	18	30	30	None	None	None	None
Hand-hole plate.....	6	6	6	6	18	18	18	18
Man-hole plate.....	None	None	None	None	120	120	120	120
Stack plate.....	None	None	None	None	90	90	90	90
Total.....	1103	1113	1600	1576	2840	2880	2880	3220
								3462

When ordering castings, especially the fire arch, be sure to state for full or half front; also give horse-power or size of Boiler.

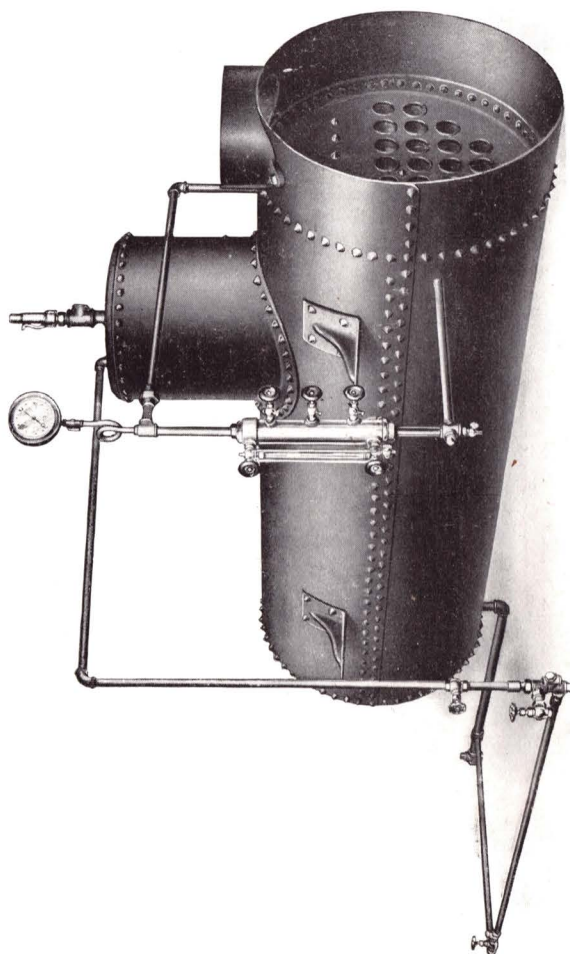


View of 15 H.P. Half Front Horizontal Tubular Boiler Setting

Table Showing Approximate Weight of Castings for Half
Front Horizontal Boilers

Diameter.....	30 Ins.	30 Ins.	36 Ins.	42 Ins.	44 Ins.	44 Ins.	48 Ins.	48 Ins.
Horse-Power.....	S	10-12	15-20	25	30	35	40	45
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Bare front.....	275	275	355	553	553	553	553	553
Flue doors.....	2 Pcs.	36 2 Pcs.	81 2 Pcs.	129 2 Pcs.	129 2 Pcs.	129 2 Pcs.	129 2 Pcs.	130 2 Pcs.
Flue door frame...	52	52	78	142	142	142	142	162
Fire doors.....	37	37	83	83	98	98	98	162
Ash doors.....	26	26	61 2 Pcs.	61 2 Pcs.	55 2 Pcs.	55 2 Pcs.	55 2 Pcs.	90 2 Pcs.
Fire arch.....	32	32	Top 63 Sides 32 Rest 37	Top 63 Sides 32 Rest 37	Top 63 Sides 32 Rest 37	Top 63 Sides 32 Rest 37	Top 63 Sides 32 Rest 37	Top 63 Sides 32 Rest 37
Front grate rest....	30	30	30	87	87	87	87	108
Grates.....	10 Pcs. 250 3x30 ins.	10 Pcs. 260 3x34 ins.	12 Pcs. 324 3x36 ins.	14 Pcs. 560 3x42 ins.	15 Pcs. 600 3x48 ins.	15 Pcs. 640 3x48 ins.	16 Pcs. 640 3x54 ins.	14 Pcs. 682 3x54 ins.
Back grate rest...	15	15	25	49	49	49	49	49
Circle bars.....	5 Pcs.	5 Pcs.	6 Pcs.	114 7 Pcs.	133 7 Pcs.	133 7 Pcs.	133 7 Pcs.	133 7 Pcs.
Circle bar rests....	2 Pcs.	40 2 Pcs.	44 2 Pcs.	44 2 Pcs.	95 2 Pcs.	95 2 Pcs.	95 2 Pcs.	95 2 Pcs.
Soot door.....	16	16	16	28	28	28	28	28
Soot door frame...	17	17	17	36	36	36	36	36
Hood.....	18	18	30	50	50	50	50	50
Hand-hole plate....	6	6	6	18	18	18	18	18
Manhole plate.....	None	None	None	120	120	120	120	120
Total.....	945	955	1395	2242	2282	2282	2282	2740

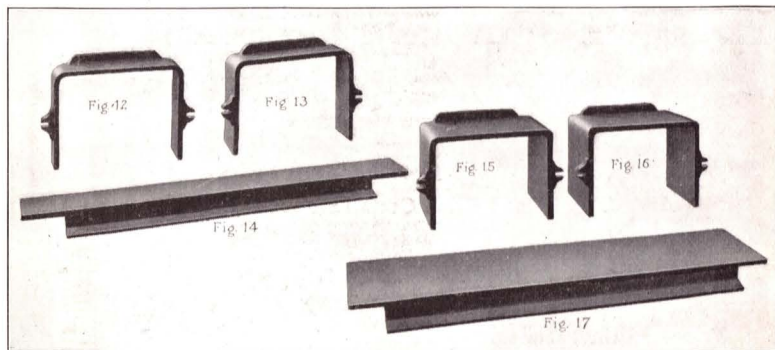
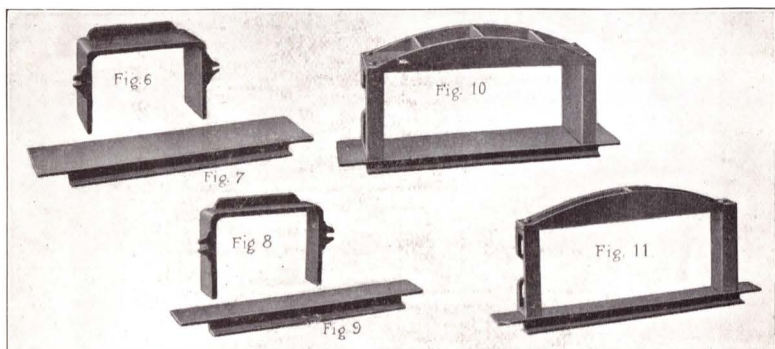
When ordering castings, especially the fire arch, be sure to state for full or half front; also give horse-power or size of boiler.



Cut of Our 8, 10, 12 and 15 H. P. Horizontal Shells, showing Single Sheet Construction, also Water Column Connection, the Injector and Piping and the Pop Safety Valve in Dome

The illustrations below show the castings which form the sides, top and bottom of fire door openings in our Horizontal Boilers, and are properly called Fire Arches.

When ordering these repairs, customer must always give the H. P. of Boiler and state if for full or half front.



Fire Arch (Fig. 6) and Front Grate Rest (Fig. 7) for 8, 10 and 12 H. P. Full Front Horizontal Boilers.

Fire Arch (Fig. 8) and Front Grate Rest (Fig. 9) for 8, 10 and 12 H. P. Half Front Horizontal Boilers.

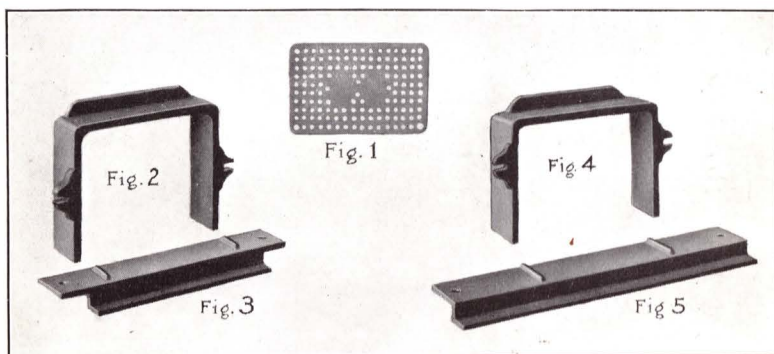
Fire Arch complete (Fig. 10) for 15, 20 and 25 H. P. Full Front Horizontal Boilers.

Fire Arch complete (Fig. 11) for 15, 20 and 25 H. P. Half Front Horizontal Boilers.

Fire Arches (Figs. 12, 13) and Front Grate Rest (Fig. 14) for 30, 35, 40, 45 and 50 H. P. Half Front Horizontal Boilers.

Fire Arches (Figs. 15, 16) and Front Grate Rest (Fig. 17) for 30, 35, 40, 45 and 50 H. P. Full Front Horizontal Boilers.

Fire Arches for Ideal Economist Boiler



Fire Arch (Fig. 2) for 4, 5, 6, 7, 8, 10 and 12 H. P. Economist Boilers.

Fire Arch (Fig. 4) and Front Grate Rest (Fig. 5) for 15 and 20 H. P. Economist Boilers.

Front Grate Rest (Fig. 3) for 4, 5, 6, 7, 8, 10 and 12 H. P. Economist Boilers.

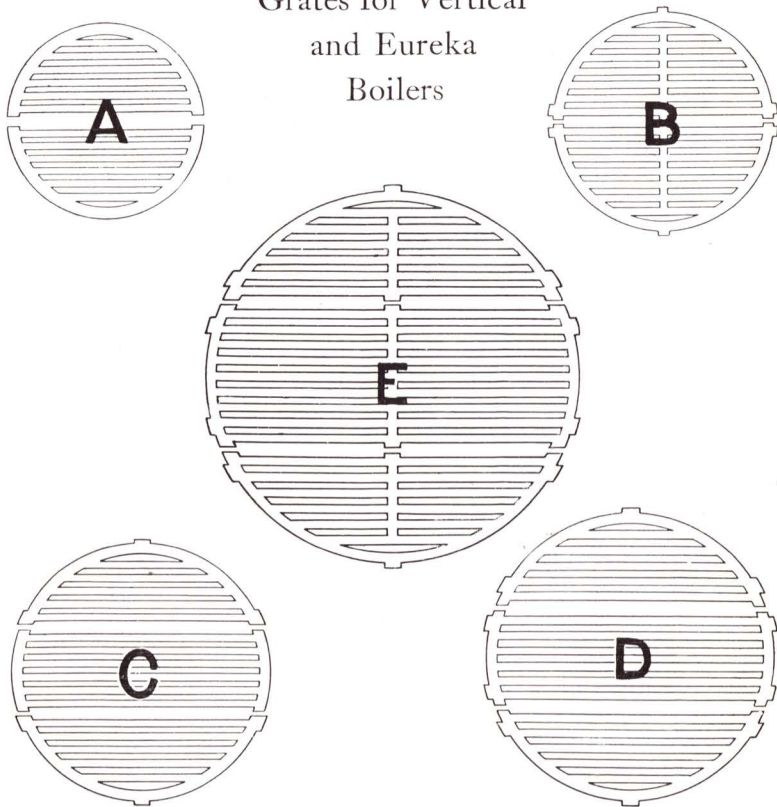
When ordering, *always* give the H. P. of Boiler.

Fig. 1 shows the perforated plate or liner, which is bolted to the inside of all fire doors on Economist and Horizontal Boilers. This liner protects the door from the heat. When ordering, give size and style of Boiler.

Table Showing Approximate Weight of Castings for
the Ideal Economist Boilers

Horse-Power.....	4	5	6	7	8	10	12	15	20
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Front casting.....	90	90	90	130	130	130	130	220	220
Fire door frame.....	11	11	11	12	12	12	12	none	none
Fire doors.....	{ Door 17 } { Liner 11 }	28	28	28	28	28	28	{ Door 27 } { Liner 11 }	38
Ash doors.....	8	8	8	10	10	10	10	10	10
Fire arch.....	38	38	38	38	38	38	38	34	34
Front grate rest.....	20	20	20	26	26	26	26	32	32
Flue door frame.....	43	43	43	52	52	52	52	78	78
Flue doors.....	35	35	35	2 Pcs.	2 Pcs.	2 Pcs.	2 Pcs.	2 Pcs.	2 Pcs.
Hood.....	20	20	20	20	20	20	20	30	30
Grates.....	{ 2 Pcs. 10x24 ins. }	90	90	{ 8 Pcs. 3x30 ins. }	200	200	200	{ 10 Pcs. 3x36 ins. }	270
Back grate rest.....	29	29	29	33	33	33	33	42	42
Back casting.....	160	160	160	219	219	219	219	366	366
Back soot doors.....	2 Pcs.	2 Pcs.	2 Pcs.	31	31	2 Pcs.	2 Pcs.	2 Pcs.	2 Pcs.
1 Back soot door liner.	10	10	10	10	10	10	10	10	10
Tile supporter in rear.	10	10	10	11	11	11	11	13	13
"Z" bars.....	2 Pcs.	2 Pcs.	2 Pcs.	110	4 Pcs.	4 Pcs.	4 Pcs.	4 Pcs.	4 Pcs.
Lugs.....	60	4 Pcs.	4 Pcs.	78	4 Pcs.	4 Pcs.	4 Pcs.	140	6 Pcs.
Hand-hole plate.....	4	4	4	5	5	5	5	5	5
Total.....	747	762	779	1052	1067	1082	1100	1538	1657

Grates for Vertical and Eureka Boilers



Grate A—For “Little Giant.” 2 and 3 H. P. Vertical Boilers; also Nos. 1, 2 and 3 Eureka Boilers. Outside diameter, 16½ inches; weight, 20 pounds; 2 sections.

Grate B—For 4 and 5 H. P. Plain Vertical Boilers and 5 H. P. Submerged Flue Boiler. Outside diameter, over lugs, 19 inches; not including lugs, 17½ inches; weight, 45 pounds; 2 sections.

Grate C—For 6 H. P. Vertical Boiler. Outside diameter, over lugs, 21½ inches; not including lugs, 20½ inches; weight, 80 pounds; 3 sections.

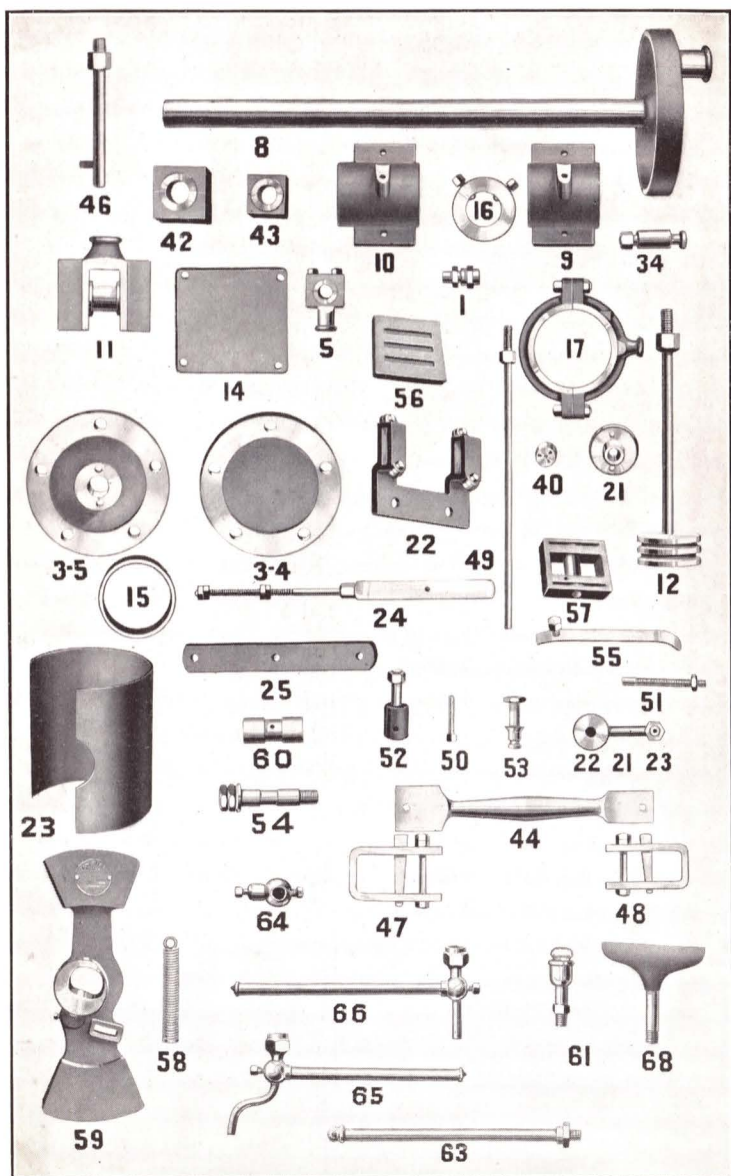
Grate D—For 8 and 10 H. P. Vertical Boilers and 8, 10 and 12 H. P. Submerged Tube Boilers. Outside diameter, over lugs, 23½ inches; not including lugs, 22 inches; weight, 90 pounds; 3 sections.

Grate E—For 12, 14, 16 H. P. Vertical Boilers and 15 H. P. Submerged Flue Boiler. Outside diameter, over lugs, 30 inches; not including lugs, 28½ inches; weight, 170 pounds; 3 sections.

Smoke-Stacks

Diameter of Stack	MADE OF NO. 16 STEEL	MADE OF NO. 14 STEEL	MADE OF NO. 12 STEEL	MADE OF NO. 10 STEEL	MADE OF NO. 8 STEEL
	Weight per Ft. Lbs. about	Weight per Ft. Lbs. about	Weight per Ft. Lbs. about	Weight per Ft. Lbs. about	Weight per Ft. Lbs. about
10	7½	9½	14	15½	.....
12	9	11½	16	18½	.....
14	10½	13¼	18	21½	.....
16	12	15¼	20	24½	.....
18	13½	17¼	22½	28	.....
20	15	19	25	31	.....
22	16½	21	27½	34	.....
24	17½	22½	29½	37	.....
26	19	24	32	40	.....
28	20½	26	34½	43	.....
30	22	28	36½	46	56
32	23	29½	39	49	59½
34	24	31	41	52	63
36	25	32½	43½	55	66½
38	.....	34	45	58	70
40	.....	35½	47	61	73½
42	.....	37	49½	64	77
44	.....	39	52	67	80½
46	.....	41	54½	70	84
48	.....	45	56¾	73	87
50	.....	.....	59	76	90½
52	.....	.....	61½	79	94
54	.....	.....	64	82	97½
56	.....	.....	66½	85	101
58	.....	.....	69	88	104
60	.....	.....	71½	91	107½

NOTE.—For Elbow in Stack add cost of 8 FEET OF STACK.



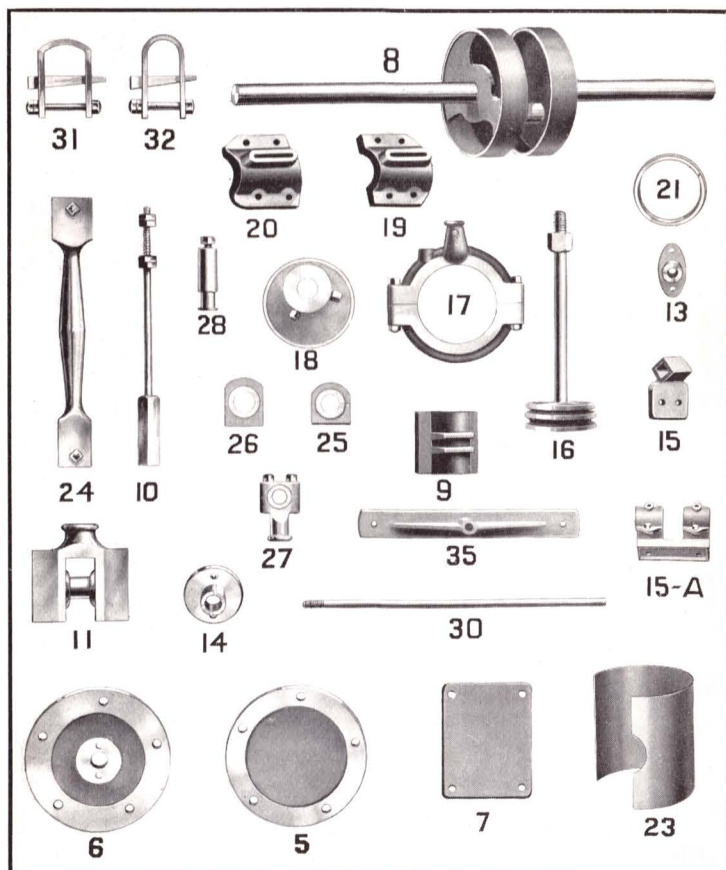
Separate Parts for Jewel Automatic Engine

Price List of Separate Parts for Jewel Automatic Engines

PIECE NUMBER AND NAME OF PART	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
1 Valve Gland ¹ / ₂ on Nos. 1, 2 and 3 Jewels are brass	\$2.00	\$3.00	\$3.00	\$2.00	\$2.50	\$3.00	\$3.50	\$4.00	\$4.00	\$4.00
3-4 Top cylinder head.....	5.00	5.00	5.00	5.60	8.60	10.00	11.00	12.00	12.00	12.00
3-5 Bottom cylinder head.....	6.00	6.40	6.40	8.80	11.00	14.00	16.00	17.00	17.50	18.00
5 Brass toggle.....	3.50	4.00	4.00	4.00	7.00	7.00	8.00	9.00	9.50	10.00
8 Crank shaft and pin.....	19.20	25.80	25.80	34.40	58.00	58.00	70.00	80.00	85.00	90.00
9 Box cap.....	1.40	1.60	1.60	2.30	3.20	3.20	4.00	5.00	6.00	7.00
10 Box cap.....	1.50	1.80	1.80	2.60	3.20	3.20	4.50	5.50	6.50	7.50
11 Cross head.....	5.00	6.00	6.00	10.00	13.00	13.00	14.00	15.00	16.00	18.00
12 Piston head and rod.....	4.40	4.80	4.80	6.60	9.00	10.00	11.00	12.00	14.00	16.00
14 Steam chest cover.....	3.00	4.10	4.10	5.20	6.20	6.20	7.00	8.00	9.00	10.00
15 Piston rings, each.....	.80	1.00	1.00	1.25	1.75	2.00	2.50	3.00	3.50	4.00
16 Shaft collar.....	1.50	1.80	1.80	2.50	3.20	3.20	4.00	5.00	6.00	7.00
17 Eccentric strap.....	2.50	3.00	3.00	3.60	5.00	5.00	7.00	8.00	9.00	10.00
18 Piston gland.....	1.90	1.90	1.90	2.50	3.20	3.20	4.00	5.00	5.50	6.00
22-21-23 Center oiler.....	2.20	2.60	2.60	3.00	3.50	3.50	4.00	6.00	6.00	6.00
22 Valve stem yoke.....	.80	1.30	1.30	1.80	2.80	2.80	3.50	4.00	5.00	6.00
23 Cylinder jacket.....	1.00	1.25	1.50	2.00	2.50	2.50	3.00	3.25	3.50	4.00
24 Valve stem.....	2.80	3.30	3.30	4.20	5.50	5.50	6.00	7.00	8.00	9.00
25 Top way, each.....	1.80	2.60	2.60	3.20	5.00	5.00	6.00	6.50	7.00	8.00
34 Toggle pin.....	1.40	1.50	1.50	2.70	4.00	4.00	5.00	6.00	8.00	9.00
40 Spool.....	1.00	1.00	1.00	1.40	1.40	1.40	1.60	2.00	2.50	3.00
42 Wrist pin box.....	4.40	5.40	6.60	9.60	11.00	11.00	20.00	24.00	30.00	36.00
43 Cross head box.....	4.00	4.40	4.40	7.20	9.00	9.00	16.00	18.00	20.00	24.00
44 Connecting rod.....	8.00	11.50	11.50	16.00	18.00	18.00	20.00	24.00	30.00	36.00
46 Center oiler standard.....	1.50	1.50	1.50	2.00	2.50	2.50	3.00	4.00	4.00	4.00
47 Wrist pin strap.....	3.60	4.50	4.50	5.60	6.50	6.50	20.00	24.00	28.00	32.00
48 Cross head strap.....	3.60	4.00	4.00	5.40	5.60	5.60	16.00	18.00	20.00	24.00
49 Eccentric rod.....	1.50	1.60	1.60	2.00	2.20	2.20	4.00	6.00	8.00	9.00
50 Slot adjusting screw.....	.50	.50	.50	.60	.70	.80	.90	1.00	1.20	1.50
51 Spring tension screw.....	.50	.70	.90	1.00	1.20	1.50	1.60	1.70	1.80	2.00
52 Arm spring stud.....	1.00	1.50	2.00	2.20	2.50	2.70	3.00	3.50	4.00	4.00
53 Governor spring stud.....	1.50	1.60	1.80	2.00	2.50	3.00	3.50	4.00	4.50	5.00
54 Governor pin.....	4.00	5.00	5.50	6.00	6.50	7.00	7.50	8.60	8.50	9.00
55 Drag spring (flat).....	1.50	2.00	2.50	3.00	3.50	4.00	5.00	6.00	7.00	7.50
56 Valve plate.....	2.50	3.00	3.50	4.00	4.50	5.00	6.00	7.00	8.00	9.00
57 Valve.....	4.50	5.00	6.00	7.00	8.00	9.00	9.50	10.00	11.00	12.00
58 Governor sp'g (coiled).....	1.50	2.00	3.00	3.50	4.00	4.50	5.00	6.00	7.00	8.00
59 Governor weight.....	10.00	11.60	12.00	18.00	20.00	22.00	30.00	36.00	40.00	50.00
60 Governor pin bushing.....	4.00	5.00	5.50	6.00	7.00	7.50	8.00	10.00	11.00	12.00
61 Cross head oil cup.....	.....	.....	.....	1.50	1.50	1.50	2.00	2.50	2.50	2.50
63 Wipe oiler standard.....	.....	.....	.....	1.50	1.50	1.50	2.00	2.50	2.50	2.50
64 Arm coupling, each.....	.....	.....	.....	1.50	1.50	1.50	2.00	2.50	2.50	2.50
65 Eccentric arm dropper.....	.....	.....	.....	2.00	2.00	2.00	3.00	3.50	3.50	3.50
66 Cross head arm dropper.....	.....	.....	.....	1.50	1.50	1.50	2.50	3.00	3.00	3.00
68 Oil scoop.....	.....	.....	.....	1.50	1.50	1.50	2.00	2.50	2.50	2.50

In ordering separate parts, always give name of part, piece number and shop number of engine.

On Jewel Engines the shop number is stamped on the upper side of the bottom cylinder head (part number 3-5) or the steam chest cover.

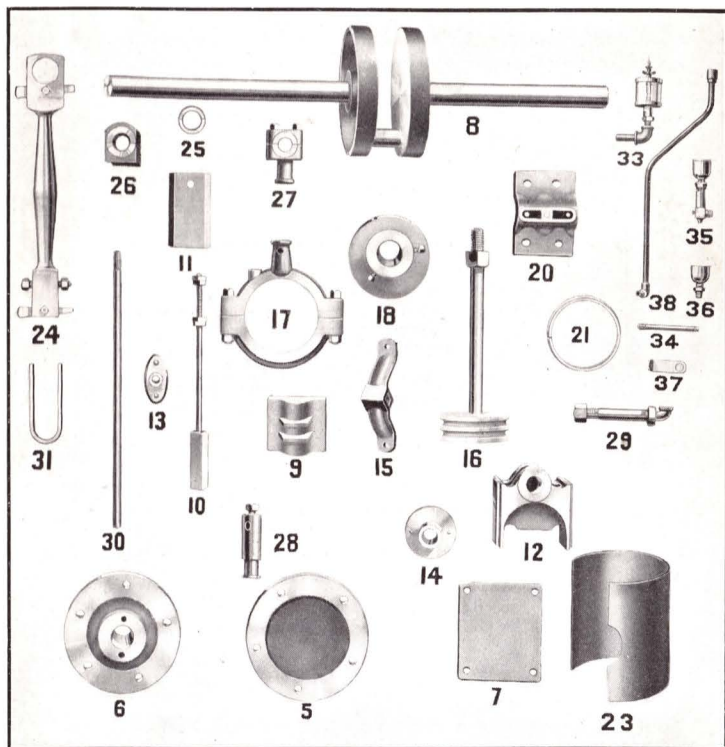


Separate Parts for Center-Crank Horizontal Engine

Price List of Separate Parts for Horizontal Center-Crank Engines

PIECE NUMBER AND NAME OF PART	4 H. P.	6 H. P.	8 H. P.	10 H. P.	12 H. P.	15 H. P.	20 H. P.	25 H. P.	35 H. P.	40 H. P.	50 H. P.
5 Top cylinder head.....	\$3.20	\$3.50	\$3.50	\$5.20	\$5.20	\$5.20	\$10.00	\$10.00	\$11.00	\$11.50	\$12.00
6 Bottom cyl. head.....	4.00	4.60	4.60	7.50	7.50	7.50	14.00	14.00	15.00	15.50	16.00
7 Steam chest cover.....	2.40	4.00	4.00	4.00	4.00	4.00	6.20	6.20	7.00	7.50	8.00
8 Crank shaft.....	12.00	18.00	22.00	25.00	30.00	35.00	48.00	55.00	95.00	95.00	100.00
9 Valve.....	1.50	2.00	2.00	3.20	3.20	3.20	5.00	6.50	7.50	8.00	9.00
10 Valve stem.....	2.40	2.80	2.80	4.00	4.00	4.00	4.30	4.30	6.00	7.00	7.50
11 Cross head.....	5.00	6.20	7.20	10.00	11.00	12.00	13.00	14.00	16.00	18.00	20.00
13 Valve gland.....	1.40	1.80	1.80	2.20	2.30	2.30	4.00	4.00	5.00	6.00	7.00
14 Piston gland.....	2.00	2.40	2.40	3.00	3.00	3.00	3.50	3.50	4.50	5.00	5.50
15 Valve stem yoke.....	.80	1.30	1.30	2.20	2.20	2.20	2.60	2.60	4.00	4.50	5.00
15-A Valve stem yoke (double).....	4.60	4.80	4.80	7.50	7.50	7.50	9.00	9.00	10.00	11.00	12.00
16 Piston head.....	2.60	4.00	4.00	4.00	4.00	4.00	8.00	8.00	8.50	9.00	9.50
17 Eccentric strap.....	3.00	3.60	3.60	4.80	4.80	4.80	7.50	7.50	8.00	9.00	10.00
18 Eccentric block.....	1.00	1.50	2.80	3.20	3.20	3.20	3.75	4.00	4.50	5.00	6.00
19 Box cap.....	1.00	1.50	2.80	3.20	3.20	3.20	3.75	4.00	4.50	5.00	6.00
20 Box cap.....	.80	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	4.50
21 Piston rings, each.....	1.00	1.25	1.50	2.00	2.25	2.50	3.00	3.50	4.00	4.50	5.00
23 Cylinder jacket.....	6.00	7.50	7.50	15.50	15.50	16.00	18.00	20.00	24.00	26.00	28.00
24 Connecting rod.....	3.60	6.00	6.00	7.50	7.50	7.50	10.00	10.00	18.00	20.00	24.00
25 Cross head box.....	3.60	6.00	6.00	7.50	7.50	7.50	10.00	12.00	24.00	30.00	36.00
26 Wrist pin box.....	2.60	3.60	3.60	4.00	4.00	4.00	7.00	7.00	9.00	9.50	10.00
27 Brass toggle.....	1.80	2.20	2.20	2.40	2.40	2.40	4.00	4.00	7.00	7.50	8.00
28 Toggle rod.....	1.40	2.00	2.00	2.60	2.60	2.60	3.00	3.00	5.00	6.00	7.00
30 Eccentric rod.....	3.60	3.90	3.90	5.90	5.90	5.90	6.50	6.50	18.00	20.00	22.00
31 Wrist pin strap.....	3.60	3.90	3.90	5.90	5.90	5.90	5.50	5.50	12.00	14.00	16.00
32 Cross head strap.....	3.60	3.90	3.90	5.90	5.90	5.90	5.50	5.50	12.00	14.00	16.00
35 Top way, each.....	1.80	2.60	2.60	3.50	3.50	3.50	5.00	5.00	6.00	7.00	8.00

In ordering separate parts, please give name of part as well as piece number; also date of shipment or shop number.
On Horizontal Engines the shop number is stamped on the upper side of bottom cylinder head (repair No. 6) or the steam chest cover.



Separate Parts for Vertical Engine

Price List of Separate Parts for Vertical Engines

PIECE NUMBER AND NAME OF PART	1 H.P.	2 H.P.	3 H.P.	4 H.P.	5 H.P.	6 H.P.	8 H.P.	10 H.P.	12 H.P.	15 H.P.
5 Top cylinder head.....	\$1.60	\$1.80	\$1.80	\$2.20	\$2.20	\$3.20	\$3.20	\$6.00	\$6.00	\$6.00
6 Bottom cylinder head.....	2.30	2.40	2.40	4.00	4.00	4.00	4.60	7.40	7.40	7.40
7 Steam chest cover.....	1.60	1.80	1.80	2.40	2.40	4.00	4.00	4.40	4.40	4.40
8 Crank shaft.....	10.80	11.00	11.00	12.00	12.00	18.50	22.00	25.00	30.00	35.00
9 Valve.....	.80	1.00	1.00	1.50	1.50	2.00	2.00	3.20	3.20	3.20
10 Valve stem.....	1.80	2.00	2.00	2.40	2.40	2.80	3.00	4.00	4.25	4.50
11 Valve head shoe, each.....	.80	1.00	1.00	1.50	1.50	2.20	2.20	3.00	3.00	3.00
12 Cross head.....	2.80	3.00	3.00	5.20	5.20	5.20	5.20	8.00	8.25	8.50
13 Valve gland.....	1.30	1.50	1.50	1.50	1.50	1.80	1.80	2.40	2.40	2.40
14 Piston gland.....	1.80	2.00	2.00	2.00	2.00	2.40	2.40	3.00	3.00	3.00
15 Valve yoke.....	1.00	1.00	1.00	1.20	1.20	1.50	1.50	2.00	2.00	2.00
16 Piston.....	2.60	2.80	2.80	4.60	4.60	4.80	4.80	7.50	7.50	7.50
17 Eccentric strap.....	2.60	2.60	2.60	2.60	2.60	4.00	4.00	4.00	4.00	4.00
18 Eccentric block.....	2.40	2.50	2.50	3.00	3.00	3.60	3.60	4.80	4.80	4.80
20 Box cap, each.....	1.00	1.20	1.20	1.30	1.30	1.80	1.80	3.20	3.20	3.20
21 Piston ring, each.....	.80	1.00	1.00	1.00	1.20	1.50	1.50	2.50	2.50	2.50
23 Cylinder jacket.....	1.80	2.00	2.00	2.40	2.40	3.00	3.00	4.00	4.00	4.00
24 Connecting rod.....	4.80	5.00	5.00	5.20	5.20	6.00	6.00	10.00	10.00	10.00
25 Cross head box.....	2.00	2.20	2.20	2.20	2.20	3.60	3.60	6.60	6.60	6.60
26 Wrist pin box.....	3.00	3.20	3.20	3.60	3.60	4.00	4.00	5.00	5.00	5.00
27 Brass toggle.....	3.80	4.00	4.00	4.00	4.00	4.00	4.00	5.00	5.00	5.00
28 Toggle pin.....	1.60	1.80	1.80	1.80	1.80	2.20	2.20	2.50	2.50	2.50
29 Cross head pin.....	2.00	2.20	2.20	2.20	2.20	2.70	2.70	3.60	3.60	3.60
30 Eccentric rod.....	1.20	1.40	1.40	1.40	1.40	2.00	2.00	2.60	2.60	2.60
31 Rod strap.....	1.60	1.80	1.80	1.80	1.80	2.40	2.40	2.40	2.40	2.40
33 Sight feed oiler for cross head and crank pin	.....	.....	.....	1.00	1.00	1.50	1.50	1.80	1.80	1.80
34 Oil tube to "L" oiler cup.....	.....	.....	.....	.40	.40	.40	.40	.50	.50	.50
35 Cross head "L" oiler cup.....	.....	.....	.....	1.50	1.50	2.00	2.00	2.00	2.00	2.00
36 Oil funnel.....	.....	.....	.....	.50	.50	.60	.60	.60	.60	.60
37 Oil funnel bracket.....	.....	.....	.....	.30	.30	.30	.30	.40	.40	.40
38 Oil tube to crank pin.....	.....	.....	.....	.80	.80	1.00	1.00	1.20	1.20	1.20
42 Large bronze boxes from jewel cut.....	.....	.....	.....	.....	.....	.....	.....	9.60	9.60	9.60
43 Small bronze boxes from jewel cut.....	.....	.....	.....	.....	.....	.....	.....	7.20	7.20	7.20
44 Connecting rod from jewel cut.....	.....	.....	.....	.....	.....	.....	.....	16.00	16.00	16.00
47 Strap, bolt, key large end rod, jewel cut.....	.....	.....	.....	.....	.....	.....	.....	5.60	5.60	5.60
48 Strap, bolt, key small end rod, jewel cut.....	.....	.....	.....	.....	.....	.....	.....	5.40	5.40	5.40

Please notice that the three larger sizes for Numbers 24, 25, 26 and 31 are blank. We use Numbers 42, 43, 44, 47 and 48 instead. Same as Jewel cut for No. 4 Engine. That is to say, Numbers 42, 43, 44, 47 and 48 of the No. 4 Jewel we use in the 10-, 12- and 15-horse Vertical Engine.

In ordering separate parts, please give name of part as well as piece number; also date of our shipment or shop number.

On Vertical Engines the shop number is stamped on the bottom cylinder head, or on the steam chest cover. See following pages for diagrams showing location of various parts.

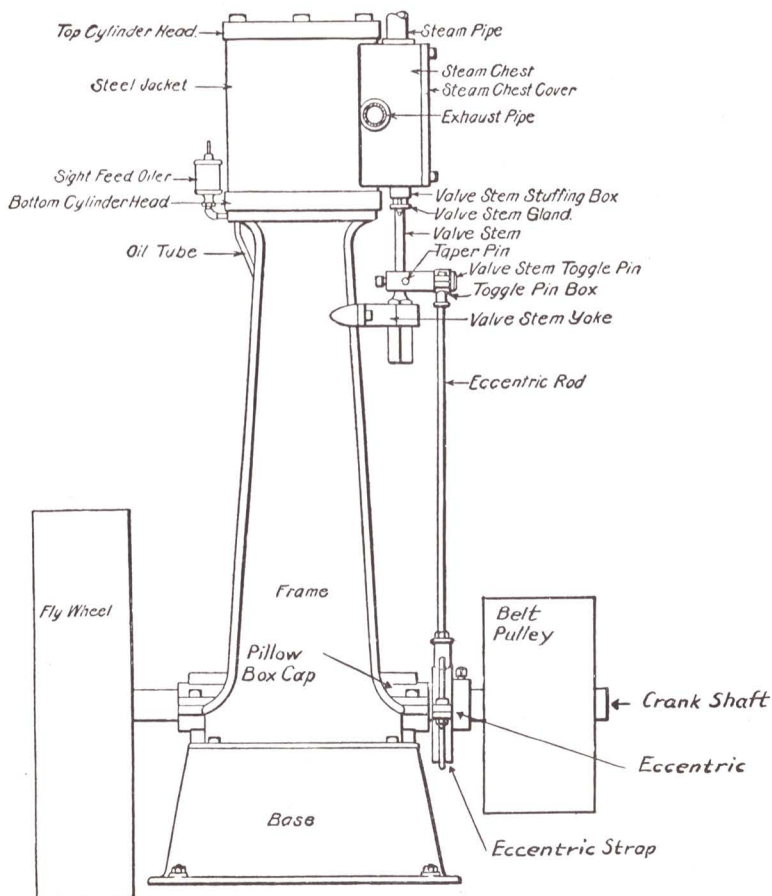


Diagram of Vertical Engine

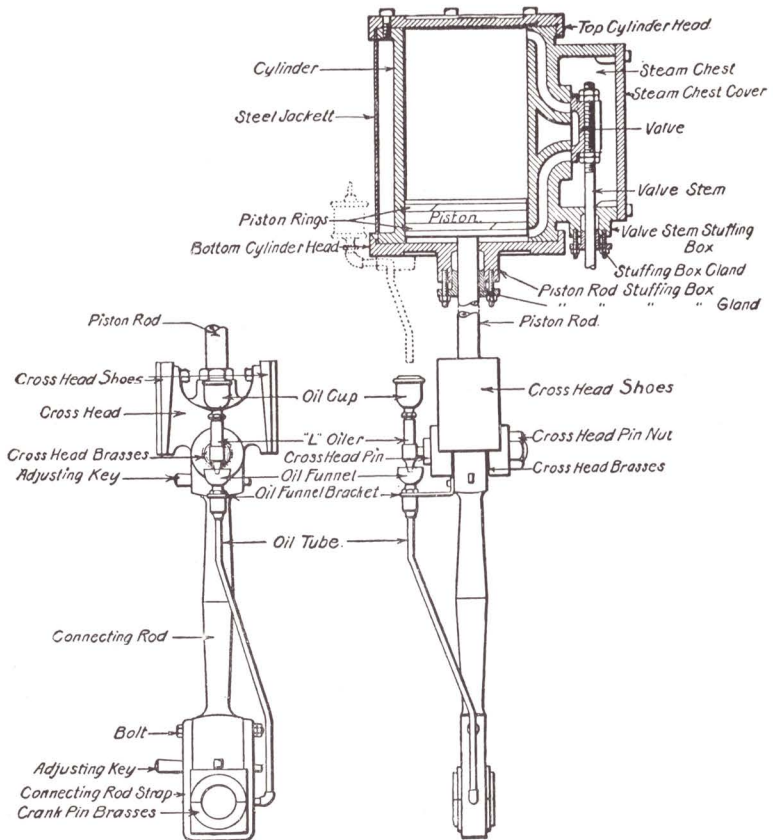


Diagram of Cylinder, Cross Head and Connecting Rod, Showing New Oiling Device

Telegraphic Cipher Code

Customers' Inquiries

SHIPPING

CODE WORD

How soon can you ship?.....	Biscuit
Have you shipped——?.....	Bishop
When will you ship?.....	Bismuth
Get ready for quick shipment.....	Bison
Ship by mail.....	Bitter
Ship by express.....	Bitumen
Ship by express C. O. D.....	Bivalve
Ship by rail (freight).....	Blab
Ship by steamer.....	Blacken
Ship and draw with bill of lading.....	Blackfish
Shipment not arrived. Send hot wire tracer immediately.....	Blackleg
By what route did you ship?.....	Blade
Ship at car-load rates.....	Bland
Ship at less car-load rates.....	Blonde
Include in car if possible.....	Blarney
What is car-load rate from your place to——?.....	Blast
What is less than car-load rate from your place to——?...	Blazing

PRICES, QUOTATIONS, ETC.

Wire immediately best price for——.....	Bless
At what price and how soon can you ship——?.....	Blink
Have made quotations to——. Protect us.....	Blister

MISCELLANEOUS

Call us on long distance telephone.....	Blood
Do not understand your telegram. Have it repeated.....	Bloomer
Hold our order until arrival of outside goods.....	Blossom
Have outside goods all arrived?.....	Blotter
Don't fail to include all outside goods.....	Blubber
There is a mistake in our order. It should read——.....	Blotch
Furnish boiler and engine on separate bases.....	Blouse
Furnish boiler and engine on combined base.....	Bluebird

ORDERS

Wire when you will complete shipment of——.....	Bluster
Order urgent. Rush shipment every way possible.....	Bobolink
Hold order and do nothing until further advised.....	Bobtail
You may enter our order if you can ship in——days.....	Bodice
Enter order and ship as soon as possible.....	Bolster
Get ready and hold subject to our orders——.....	Bomb
Cancel order.....	Bonfire
Have you in stock——.....	Bopeep

Replies to Customers

SHIPPING

CODE WORD

Can ship today.....	Album
Can ship tomorrow.....	Alcohol
Can ship in three days.....	Alcove
Can ship in four days.....	Alder
Can ship in five days.....	Alert
Can ship in six days.....	Alfalfa
Can ship in one week.....	Algebra
Can ship in ten days.....	Alimony
Can ship in two weeks.....	Alkaline
Can ship in three weeks.....	Alley
Can ship in one month.....	Alligator
Can ship in six weeks.....	Allopath
Can ship in two months.....	Allspice
Can ship immediately on receipt of order.....	Allure
We expect to ship.....	Alluvial
Shipment unavoidably delayed.....	Almanac
Will ship on the.....	Almond
Shall we ship.....?	Alms
Entering your order, but conditions make it impossible to promise shipment before.....	Alphabet
We cannot promise to ship before.....	Altar
We may be able to ship.....	Alpine
Car-load rate per 100 pounds is.....	Alto
Less car-load rate per 100 pounds is.....	Altitude
Cannot ship before.....	Amber
Could substitute.....and forward immediately. Wire instructions	Ambition
Shall we ship what we have ready?	Amble
Wire shipping instructions at once.....	Andante

PRICES, QUOTATIONS, ETC.

Spot cash price for——is——F. O. B. cars factory.....	Anatomy
Cannot change our quotations. Best can do.....	Anarchy
All former quotations are hereby withdrawn.....	Ancessor
Price given is for immediate acceptance only.....	Anchor
Information given is not definite enough to enable us to quote. Advise us more fully.....	Ancient

MISCELLANEOUS

Can't explain by telegram. Have written fully by this mail..	Andiron
Information given is not explicit. Can't furnish unless we are more fully and definitely advised.....	Angry
No material in stock for.....	Anguish
We are shut down.....	Anthem
Will let you know by letter, in reference to.....	Antidote
Best we can do.....	Antelope

Replies to Customers — *Concluded*

MISCELLANEOUS—*Concluded.*

CODE WORD

Outside goods not arrived.....	Ankle
We cannot sell at the price you offer.....	Antic
With bill of lading attached.....	Anvil
We have drawn at——days' sight.....	Antique
Shall we draw at sight?.....	Anthill
How soon and for how much may we draw?.....	Annals
Have you remitted?.....	Angular
Our representative will call on you——	Acrobat
Outside goods are here from——	Arrow
Outside goods are not here from——	Acorn
Are including outside goods from——	Ability
Outside goods from——delayed. Shall we hold car?.....	Absorb
Can get no definite advice as to outside goods from——	Abscond
Outside goods with ours.....	Actress
Outside goods with ours make car-load.....	Actor
Outside goods with ours do not make car-load.....	Acre
Are forwarding today car including your orders No.——	Abdomen
Are holding shipment for routing instructions.....	Abeance
We need——lbs. to make minimum weight.....	Acid
Have sufficient weight.....	Aisle
Everything with exception of.....	Accident

ORDERS

Will forward your car tomorrow. If any additions, wire quick	Amalgam
Loading your car today. Wire quick any additions.....	Amateur
After receiving order.....	Avenue
We will complete shipment of your order——	Ashes
Will ship order complete with exception of——	Asylum
Have entered your order.....	Asbestos
Too late to change your order.....	Asunder
Have canceled your order.....	Ashby
Your order——ready to ship. Wire shipping instructions..	Athletic
Shall we furnish engine and boiler on combined base?.....	Autumn
Shall we furnish engine and boiler on separate bases?.....	Avenge
Is your order still in force?.....	Awning
Shall we enter your order?.....	Awake
Your order was shipped——	Avowal
If ordered immediately could ship——	Aversion
Not in position to furnish——	Awkward



